School Shop

vol. XVII no. 10
JUNE 1958

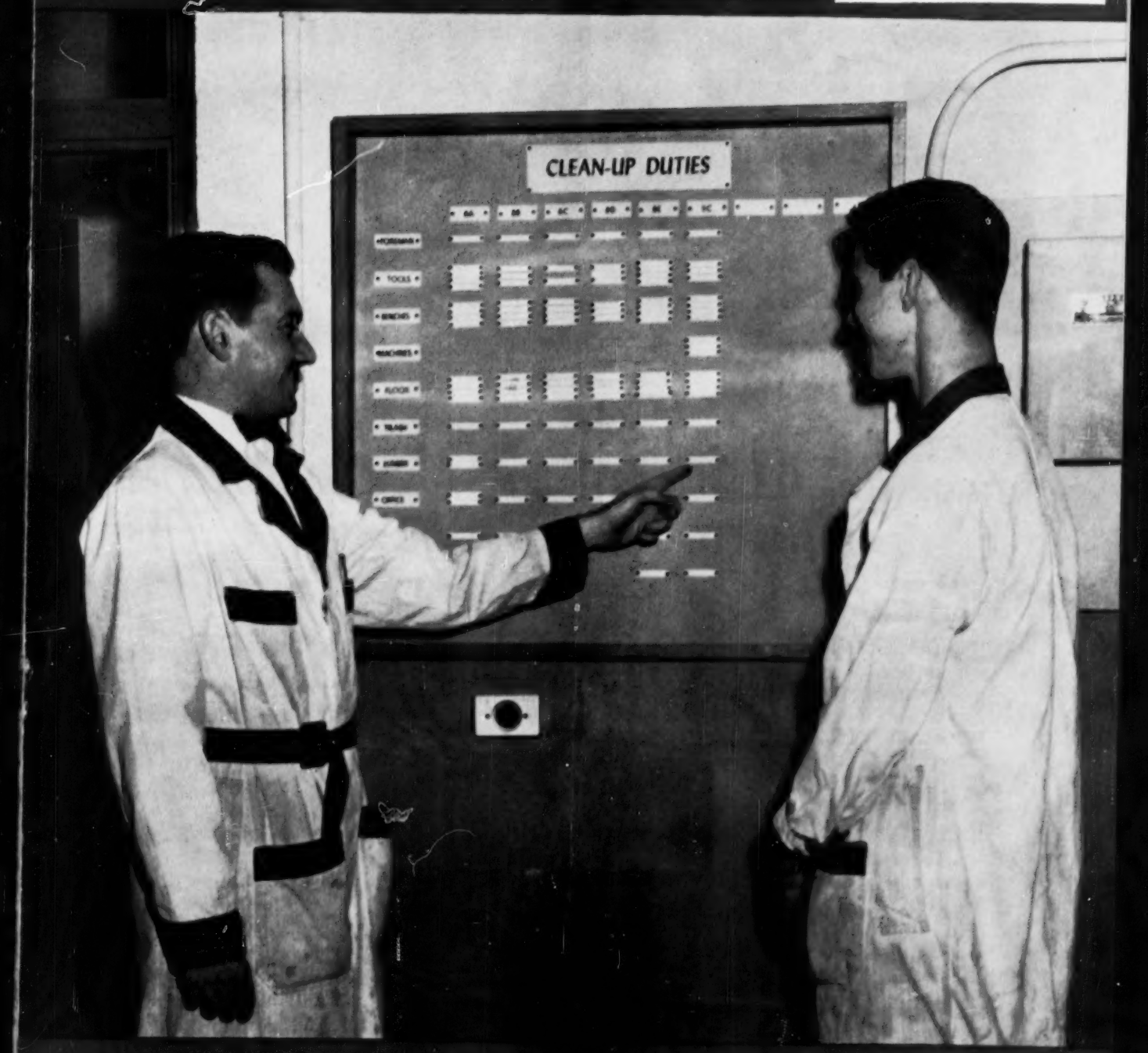
Students Make Science "Real"
by Abraham Calmus

"Opportunity" for Learning
by Ted C. Leisenring

Good Design—What Is It?
by Earl M. Weber

Clean Up!
by David C. Lewis

Cover story: An instructor (left) checking clean-up assignments with a student in the shop at Edgewood High School, Bel Air, Md. You, too, can have a similar board if you follow the instructions in the article "Clean Up!" that appears on page 11.



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[1]See page 29.

[2]Published by *American Technical Society* as a service to industrial education.

[3]Professor of Industrial Education, Michigan State University; President, American Industrial Arts Association.

[4]Formally entitled *The Role of Physical Maturation in Determining the Ability of Junior High School Boys to Perform Complex Finger Coordinative Activities and an Index to Level of Ability.*

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School Shop TALK

COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

Beef Needed

Daily newspapers, popular magazines, and radio and TV commentators are keeping up a constant barrage of criticism of the public schools. Sometimes it is constructively critical, but oftentimes it is based on misunderstanding or ignorance. The portion that is constructively critical frequently deals with the lack of high standards of content in course offerings and of low requirements of performance from students.

Without falling into the same error as many critics of the schools who generalize from too few cases or attempt to compare all of the high schools of the nation when they are as different as eagles and sparrows, these critics have a point, as far as some industrial-arts courses are concerned, we must admit.

For instance, most of the lists of objectives of industrial-arts teaching include mention of how shop work is an application of scientific and mathematical principles and how students can learn how these principles are applied when they take industrial-arts courses. This is a laudable educational objective, but let's face it. How often can you find an industrial-arts teacher actually attempting to help students get an understanding of scientific and mathematical principles when they are working on a project?

Once in awhile the answer is "yes." The electricity and radio and electronics units or courses, from necessity, usually include what we are talking about, but even in these areas the level of information is frequently low and the performance by students is not held to very high standards. In other shop areas such as woodworking, metalworking, and machine shop, the opportunities that could be utilized for the learning of math and science content are seldom employed for the purpose.

As Vern Pickens pointed out in these columns not long ago, it is easy to underestimate the capacity of the young mind to comprehend principles and to solve problems. Properly stimulated, high-school students are capable of a much higher level of accomplishment than they normally are expected to attain by most shop teachers.

Very often courses of study and descriptions of shop activities mention the scientific and mathematical principles that can be learned. Unfortunately, such learnings are not automatic. They have to be taught for. This is the area where much industrial-arts teaching is weak.

A definite and comprehensive effort has to be made by the teacher to beef up the content of his work and to raise the level of performance by the student. Otherwise, the critics of industrial-arts education, friendly and hostile, will continue to point out the low-grade metal coming from a program that is rich in educational ore that is not being mined as efficiently as it should be.— *L. W. P.*

What Price Idle Shops?

SCHOOL SHOP started this school year by publishing an article by Wallace Houg titled "Reclaiming Young Men in a School Shop." Now that this school year is ending, we ask that you dig out last September's issue and review the piece. Bear in mind while you do this that Mr. Houg used shop facilities that would normally have been *idle* during the summer months, "touched by nothing but the summer's heat and dust, unsullied by human hands." Bear in mind, too, that Mr. Houg raised the money for his reclamation program by drawing on his imagination and wit, using all of the creative abilities at his command.

Next, after you have reread the piece, please stop and think for a moment what will be happening in your school's shop this summer. Will it be "touched by nothing but the summer's heat and dust, unsullied by human hands"? Or, is it going to be part of your community's summer recreation program, an adult-education program, or a reclamation effort such as Mr. Houg's?

Any summer program you put into effect using your shop is well worth your effort. Write and tell us about it, and include some pictures. We would like to run a story next Fall on summer programs.—*O. H.*

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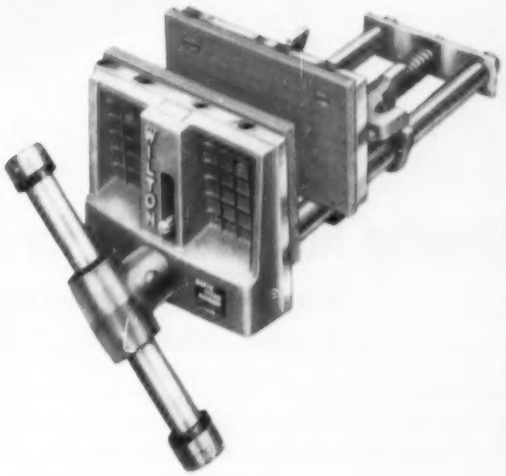

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In this industrial-arts program

Students Make Science "Real"

By Abraham Calmus

Chairman, Department of Industrial Arts, Bronx, N.Y., High School of Science

A student operating a drill press in the "science technique laboratory" of the Bronx High School of Science. Students here correlate their science knowledge with the projects they choose to make.

SOME years ago, in the course of a visit to the Bronx High School of Science, a famous scientist was taken through the industrial-arts shops. Classes were in session and the scientist walked around watching students at work on their projects. His questions were polite and perfunctory until he stopped before a boy working on a special project.

"What is this?" he asked.

"It's a model of the Langmuir-Lewis atom," the 16-year-old boy replied.

"Would you explain it to me?" asked the scientist.

The boy hesitated, looked at the scientist, and answered, "It's rather complicated, maybe too difficult for you to understand." Encouraged to proceed, the boy discussed the extremely complicated theory on which the model was based, to the amazement of Dr. Irving Langmuir.

Another student who built a microscope was elected a Fellow of the Royal Microscopic Society of London. Recently, we displayed some of our students' projects in a window of R. H. Macy's main store in downtown New York. These included an earth satellite, an electronic computer, a motor-driven telescope, and a high-fidelity radio and record-playing set.

We often have visitors who are interested in observing how the industrial-arts program is correlated with science and mathematics. Recently, one of these visitors suggested that a description of what we are doing would be of interest to many other educators.

The Bronx High School of Science is an academic high school for those interested in making the sciences and mathematics the bases of their future careers. The school is open to residents in any part of New York City, and the student body is selected by means of an entrance examination (arithmetic, vocabulary, and reading comprehension) and a survey of previous school record. Candidates for entrance to the three "special" high schools in New York City having science programs (The Bronx High School of Science, Stuyvesant High School in Manhattan, and Brooklyn Technical High School) all take the same entrance examination, which is rated electronically. In addition, the previous school record of candidates for the Bronx High School of Science is investigated for ability and interest in science and mathematics. Total enrolment at present is around 2400, with twice as many boys as girls. Median IQ is 137. Our new building, opening in the fall, will accommodate 3000 students.

The industrial-arts department came into existence as a separate department in 1956 when the writer was appointed to the school as chairman of industrial arts. Prior to this, three shops were considered part of the physical-science department and one shop (ninth year) part of the biology department. Mechanical drawing was part of the art department. Dr. Morris Meister, principal of the school since its founding in 1938 until last January, believed that since projects constructed by students were based on, or illustrated, scientific principles, shops should be under the direction of the science departments. However, the shop teachers hold industrial-arts licenses, the shops are equipped as general shops, and funds for equipment and supplies are allocated from the industrial-arts section of the board of education budget. These are the reasons why the writer, a licensed chairman of industrial arts, was appointed to the school. It is also appropriate, since engineering is applied science and mathematics, that he is an engineer of wide and long experience. As to whether mechanical drawing should be considered part of the art area of the curriculum, or the industrial-arts area, it must be realized that mechanical drawing is the special language of technicians in industry. It describes *accurately* the size and shape of an object or structure, and the operations to be used in making it. It is certainly not art!

We have four general shops, one of which is used for ninth-year students.

They are all equipped with the usual hand and machine tools. One shop, larger in area, has additional equipment, such as a high-temperature furnace, a lens grinder, a shaper, and a large capacity metal lathe, used for the advanced course. We have no rooms specially equipped for mechanical drawing, so we use three art rooms and one ordinary classroom.

In New York City only properly licensed teachers may teach shop classes. Our shop teachers at Science are all exceptionally capable, with many years of experience in teaching industrial arts at Science and in other schools. They also have had experience in teaching physics. If the shop program has any claim to success, it is due to the ability, drive, and teamwork of these men. In mechanical drawing, in addition to properly qualified teachers, several teachers are teaching the subject "out-of-license."

It is an obvious truism that to obtain students with ability in a particular area of the curriculum, they must be selected for that ability. It must be remembered that candidates for the school are not tested for ability in shopwork or drafting. For this reason, students in industrial arts have a wide range of ability. Their general intelligence is high and they are very cooperative, anxious to do a meritorious job. Shop classes are limited to 28 students.

Our shop courses are called "Science Techniques Laboratory" (STL). They are, according to the "Students' Guide," courses in "industrial arts related to laboratory techniques." Ninth-year students take one semester, two double periods a week, of shop, called "Natural Science Techniques Laboratory." Classes may be composed of all boys, all girls, or both boys and girls. Most projects are of a fairly elementary character, chiefly related to the science and mathematics courses taken during this year. Since this is the first shop experience of most students and time is limited, we try to familiarize students with correct, safe habits in the use of tools. Projects range from an abacus or height finder to radio sets and electronic devices.

In the tenth year all students take two semesters of mechanical drawing, four single periods a week. Students work from our own Problem Book. In the eleventh year all students take one semester of Science Techniques Lab. (STL 1), five periods a week (two double and one single period). Course requirements will be described later in detail. Classes are mixed, boys and girls.

In the twelfth year students may elect Advanced Science Techniques Lab. (STL 2). This is a one-semester course, ten periods a week (five double periods). It involves more advanced work than in STL 1. Metalworking, pattern making, heat treatment of metals, foundry work, glass blowing, grinding, polishing and silvering of lenses, mirrors, and prisms are taught. Projects must be of a more advanced character. Also in the twelfth year students may elect Advanced Mechanical Drawing (Engineering and Architectural Drawing). This includes the design of cams, gears, and other machine parts, and the preparation of plans for a small house and community building, including a mechanical perspective.

Making a term project, regardless of the tools needed to do the job, must exemplify the scientific principles learned in physics, chemistry, natural science, or in math classes.

Science Techniques Laboratory course requirements

1. *The term project.*—This is selected by the student in accordance with his or her particular interests. It must exemplify the scientific principles learned in physics, chemistry, natural science, or mathematics classes. It should involve work in various materials such as wood, metal, plastics, and glass. It may include such processes as squaring and turning wood, cutting joints in wood, finishing with varnish, shellac, etc., shaping and soldering metal, drilling, filing, cutting threads, lathe work, winding coils, blowing glass, etc. Some materials must be purchased by the student.

The project may be in the field of electronics, radio, optics, sound, photography, aeronautics, architecture, astronomy, chemistry, the biological sciences, or any other area of science and mathematics. It may be of the student's own design or obtained from science textbooks or books of projects. Current or back issues of *Popular Science, Popular Mechanics, Science and Mechanics, Popular Electronics,* and other magazines of a similar nature are sources for projects. Mathematics and science teachers suggest projects. We have files of drawings of projects made over the years, which students may examine. The school library has many books of projects. Following is a list of a few of the projects which have been made:

Crystal sets, tube sets, transistor sets, tube tester, ammeter, voltmeter, transformer, buzzer-bell, fluorescent lamp, lantern, heater, generator, electric pencil, soldering iron, telegraph set, induction coil, rheostat, galvanometer, line tester, various motors, vibrator, Tesla coil, microphone, mimeoscope, repulsion coil, foot switch, electronic timer, steadiness tester, print box, safe lights, en-

larger, projector, drier, tripod head, copying stand, time switch, titler, negative viewer, film agitator, splicer, scales, balances, Bunsen burner, ring stand, humidifier, microtome, sextant, microscope, telescope, steam engine, range finder, pumps, earth satellite, electronic computer, and demonstration apparatus.

2. *A working drawing.*—A mechanical drawing, assembly (with bill of materials) and details, fully dimensioned and noted. The drawings must be in accordance with standard practice—as learned in mechanical-drawing classes. Where necessary for clarity, isometric, cabinet, and/or exploded views must be given. Wiring diagrams, where necessary, must be included. The source of the project must be noted.

A time limit, about five weeks from the beginning of the semester, is set for the completion of the working drawings. The drawings are made at home.

3. *A notebook.*—We place a good deal of emphasis on keeping a good notebook. Demonstrations are given once a week, and though conditions for taking notes are not the best, the practice is valuable since at least 98 percent of our students go on to college. We expect each lesson to be written up in detail, with carefully drawn sketches. Additional information from individual research may be included in a separate section of the notebook.

A vocabulary list for each demonstration is supplied. Students are required to list the words for each demonstration, to define them, and to show by means of a sketch what each word means. The vocabulary list is kept in a separate section of the notebook.

At the beginning of the notebook, two or three pages are devoted to freehand sketches of the proposed project. These sketches may be in orthographic or in pictorial form. Magazine clippings may be included for additional clarity. The proposed work sequence, in the form of an operation sheet, must be shown. A bill of materials, giving all required parts, sizes, necessary hardware, and approximate cost, is required. No stock may be cut before these sketches are approved.

At the back of the notebook the student keeps a progress chart, listing what was done during each meeting of the class.

The usual system of personnel assignments is used for clean-up. Some assignments are rotated periodically. The student must keep a record of his or her assignments in the notebook.

4. *Science-basis report.*—In this report the student must give the name of his project, scientific or mathematical principles involved, and an explanation of these principles. Any reference source used must be given. This report must be handed in with the working drawings.

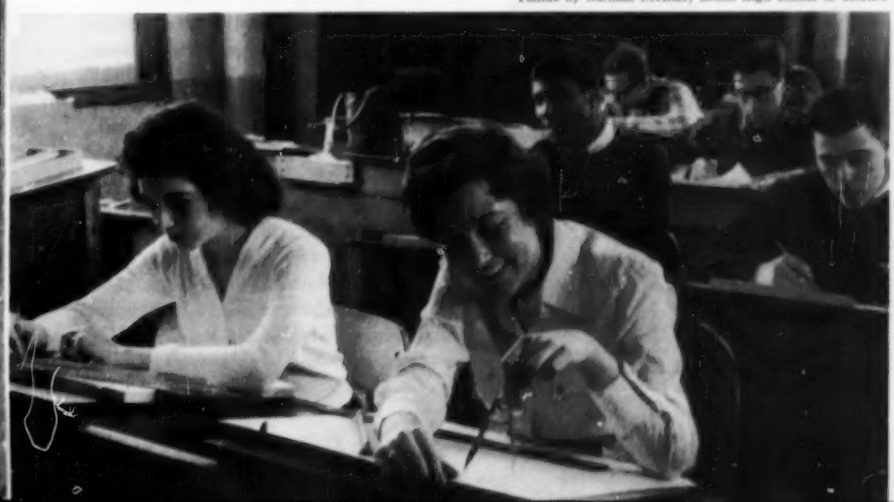
5. *Evaluation by students.*—At the end of the course students are asked to write a brief statement giving an evaluation of the course from their viewpoint, making criticisms, and suggesting changes.

6. *Final test.*—This is made up by a committee of those who teach the course. One hundred questions include completion of statements, selection from a number of given answers, indication whether true or false, some computation, some sketching, some description of operations.

7. *Final grade.*—Project 60 percent, final test 25 percent, notebook and quizzes 10 percent, cooperation and effort 5 percent. Total 100 percent.

Drawing at Bronx High School of Science must be in accordance with standard practice as learned in mechanical-drawing classes. Boys and girls benefit from this unique program.

Photos by Norman Dresner, Bronx High School of Science



Some remarks on procedures

Since every student works on a different project, instruction must be largely individual in addition to the demonstration lessons given once a week during the single period. With 28 students in the shop there is need for an exceptional degree of alertness on the part of the teacher in order to prevent accidents. Not only is there constant emphasis on safe conduct and safe work habits, but some machines, such as the circular saw and the band saw, are used only by the teacher. When a student uses a lathe, he or she must record on a form his or her name, date, period, and operation performed so that responsibility may be traced. It may be of interest to some that a girl making, say, a Bunsen burner, will do facing and turning as her first operations after cutting off stock with the power hacksaw. Any necessary operation may be a student's first operation. The teacher gives the necessary individual instruction, checks on understanding and performance, and goes on to the next student who needs attention.

When need for information in some special area of science (e.g., optics) arises, we call on a teacher who is specially qualified in this area. Fortunately, our faculty is highly qualified and we get willing cooperation. Some of these teachers use shop facilities for projects of their own and call on the shop teachers for advice.

At the discretion of the teacher in charge of a shop, competent students who have free time and who wish to work on projects may do so at any time, provided there is no class and the the teacher is present. This privilege enables students to complete projects which need more time than is available during regular class meetings, or to undertake projects beyond course requirements. Such students are usually deeply interested and have special ability in some particular area of science or technology.

It is hoped that this description of what we are doing in the field of industrial arts, with special emphasis on science and mathematics applications, may be helpful to those who wish to build a similar program or make comparisons with their present programs. Credit for such success as our shop program has attained must in all honesty go to the teachers who have worked hard over the years to overcome many handicaps and frustrations in their efforts to implement the school aim: "To make each class a laboratory for finding out facts, for testing ideas, and for learning by doing." ★

A school that lives up to its name provides

"Opportunity" for Learning Major-Appliance Repair

By Ted C. Leisenring

Coordinator, T&I Department, Emily Griffith Opportunity School, Denver, Colorado

Editor's Note: At the time of its founding in 1916, Emily Griffith Opportunity School in Denver, Colorado, represented a revolutionary step in the area of adult and vocational education. This unique school, open to Denver residents tuition-free, "for all who wish to learn," has never allowed its pioneering spirit to falter. After 41 years of continuous operation, Opportunity School is still a leader in many of its instructional programs and teaching techniques. Proof of this is found in the school's courses for major-appliance servicemen which make available practical and usable training experience for those persons wanting to advance in their service occupations as well as for many newcomers to the field.

Two students at Opportunity School working on a mock-up of a refrigerator used in teaching there.

EMILY Griffith Opportunity School's trades and industry department initiated its program for appliance-servicing training in the early 1940's with classes in the maintenance and repair of domestic refrigeration equipment.

Classes at Opportunity have always been geared to meet the needs of the community and the students who come to the school. These needs—the actual and not merely the supposed requirements of the city and its citizens—are determined with the help of lay advisory committees consisting of individuals who represent a wide variety of local business, industrial, and socio-civic groups.

Therefore, when Denver distributors began to query school officials in 1953 about the possibilities of providing instruction for automatic-washer servicemen, a special advisory committee was formed to define the need for such training and then to study, organize, and set in motion a new program in this area. It is believed the courses which resulted were the first examples of automatic-washer servicing training offered through a public school in the United States. The program is now considered one of the most outstanding of its kind in the country.

Expansion of training for appliance servicemen at Opportunity School was by no means concluded at this point. The next step came with the addition of instruction in the installation and servicing of automatic dryers. Then came specialized washer-dryer clinics, held one evening each month to provide a chance for servicemen to keep up with the latest information on new machine features, production changes, and servicing techniques. Factory representatives from major manufacturers work in conjunction with school personnel to present these after-hour clinics which have attracted the enthusiastic support of Denver-area distributors and servicemen, and national publicity as well.

A factory representative from a major manufacturer instructing servicemen on changes, features, and proper servicing techniques of a washer-dryer.

Attendance at these sessions currently averages between 50 and 100 persons each month.

Still further extension of appliance-service training at Opportunity is anticipated. Again under the guidance of an active advisory committee, plans are now being discussed for the development of instruction in the areas of gas and electric ranges, dishwashers, and ironers. At all times, courses already offered are being modified and improved to keep pace with advances in appliance installation and servicing methods.

How did the Opportunity School go about establishing instructional programs for appliance servicemen? What do these courses cover and who can benefit from them? A closer look at a particular phase of the program—automatic washing-machine servicing, for example—will answer these several questions.

As already mentioned, the original requests for washing-machine servicing training were studied carefully by an advisory committee which, in turn, assisted school administrators and faculty in originating the new program. The next consideration was the selection of qualified instructors for the course. Teachers were chosen not only on the basis of their ability to teach, but also for their practical experience and knowledge of the various types of machines which were to be studied in the course. Their potential ability to assist in the development of written instructional materials was also considered.

Next, units of instruction were compiled by the instructors and advisory committee members under the direction of the school's T&I coordinator. These units, used in lieu of standard textbooks, are organized to be adaptable to individual instruction, thus making it possible for a student to enrol in the washer-servicing program at any time during the school year and to still progress in his training as rapidly as he feels he is able.

Another distinct advantage of the basic instructional unit stems from the fact that, as new machines or new models are placed on the market and added to the course of study, a new manufacturer's manual is all that is required to expand the washer-training program, not a complete revision of the course.

Final steps in the development of the automatic washing-machine servicing program involved the selection of physical facilities for the classes, the securing of washing machines on a loan basis from local distributors, and enrolment of students.

The breadth of course content for Opportunity School appliance-servicing programs can be illustrated again by sampling the washing-machine servicing course.

The first portion of this course deals with installation procedures, including the preinstallation survey (checking physical, water, and electrical facilities), uncrating washers, and the delivery of machines. Also studied are actual installation procedures (locating washer in the home, connecting the water and electricity supplies, providing drainage, and checking the cycle of operation) and the latest in demonstration techniques.

Home servicing is studied in the second section of the course. Preparation for the service call and preliminary procedures, such as preparing the work area and gaining customer confidence, are covered. The various steps involved in examining the defective washer (checking the timer operation, water supply, electrical system, mechanical devices, drain components, etc.), diagnosing failures, and repairing the machine by replacement, or repair of inoperative parts, are studied very carefully.

After completing his study of these basic subjects, the student receives concentrated instruction on individual makes of automatic washing machines. It is during this phase of his training that he puts into practical application the primary skills he studied and learns to work with manufacturers' service manuals.

Who can benefit from the Opportunity programs for appliance servicemen? Classes offered during the day are designed for students who are just beginning their study of appliance servicing and who will be new workers in the field. Evening sessions provide an opportunity for trained individuals already working in the service field to receive instruction on machines which they have not studied previously. All students must be over 16 years of age.

Denver-area employers and employes in the automatic-appliance fields have given wholehearted support to the Opportunity School appliance-training venture. They maintain the instructional program has made the Mile High City one of the best supplied areas in the nation from the standpoint of trained servicemen. They know, too, that, as advancements in major appliances create a demand for new phases of training, Opportunity's flexible program and progressive outlook will allow for still further instructional developments aimed at meeting the needs of the community's distributors, servicemen, and consumers. ★

Some thoughts on

Good Design—What Is It?

By Earl M. Weber
Ohio University, Athens

"OH, I like that—it's different." As long as this statement applies only to ladies' hats, not too much harm can result. But there seems to be a strong trend now in applying this kind of discrimination to everything from houses and automobiles to oil paintings and jewelry. Virtually nothing, except perhaps dog collars, has escaped this mania of having to be different.

Certainly everyone is in favor of progress, and improvement is commendable, but change merely for the sake of change doesn't have much virtue, and *simply being different doesn't justify the existence of anything.*

This kind of thinking has become so prevalent it seems the word traditional has a connotation of inferior quality as compared to the supposedly superlative expression, contemporary. The word "modern" is not a synonym of the word "good" and a new or different design of any article is not necessarily good design. Good design is an elusive concept. At best it is relative, relative to time and environment. Whether the design of an article is good or bad is determined by how well it satisfies the purpose for which it was planned, and by how much appeal it has. By appeal we mean the extent to which the object pleases our senses, particularly sight and touch.

In his book, *Design in the Industrial Arts*, Bradley expresses the opinion that beauty in the design of an object causes pleasant emotions. He also states that the designer should try to achieve this quality only after the function of the article has been satisfied. Osburn concurs with this opinion in his book, *Constructive Design*, when he states that in a well designed article "form follows function."

Reduced to its simplest terms, an application of this principle means that a well designed dining table must conform to certain fixed sizes, such as height from the floor; its legs should be so arranged as to cause a minimum of interference with seating of people around it. It must be sturdy enough to support the weight and use to which it will be subjected. The material used must be suitable in regard to availability, methods of manufacture, ease of maintenance, economy, and the environment in which it will be placed.

These considerations are all concerned with the function of the table. They should be thought of as a set of limiting factors. The second part of the designer's task, and perhaps the more difficult, is to achieve beauty in the final design without trespassing beyond the limits of function. If these limits are invaded for the sake of beauty, the design is not good.

This principle can be used as a sort of two-pronged check list for evaluating and improving the quality of design of industrial-arts projects in our school shops. As we take a critical look at a project, we must answer these basic questions. First, will it work? Will it do what it is intended to do? Second, is it good looking? Does it have a pleasing and interesting appearance? If the answers to these questions are yes, there is reason to believe the design is good.

In our analysis of the design of a project in terms of function, we are on fairly firm ground. In many cases we can apply objective tests for size, strength, accuracy, and alignment of parts. Our training and experience stands us in good stead and makes us competent judges of this element of design; and for the most part the projects made in our school shops reflect this competency.

After the problem of function has been satisfactorily solved, we should plan the project so it will be pleasing in appearance. The fundamentals of design involved here are essentially subjective. The designer must take into account such elements as color and finish and appropriate ornamentation. At the same time he must consider more subtle aspects such as order, balance, and proportion.

It is in the second phase of design, that of achieving beauty, where we in industrial arts frequently seem to be lacking. Most of us recognize this shortcoming and try to correct it, but as we turn toward some of the commercial articles in the world around us for guidance, we find a great many examples that are not of much help.

Probably one of the greatest hinderances to good, original design is a tendency to imitate. This imitation takes on several forms. One of these involves use of newer materials disguised as some accepted or traditional material.

One example that comes to mind is a random-width oak-plank floor, polished smooth and with pegs showing. In its place it is, indeed, a thing of beauty. A good inlaid linoleum floor can also be beautiful to behold. With this material a much greater range of colors and patterns is possible. In function, too, it has many merits and advantages and need never be considered a cheap substitute. But, the problem that arises is: Is it progress, or is it even honest, to imitate a random-width oak floor in linoleum? There are numerous examples of similar, shall we say, "deceptions." Plastics, to mention one other, have been disguised as wood, leather, or metal.

Another form of imitation is incorporating in a design the suggestion of a function that does not exist. In this realm we have gun sights for tail lights on our cars and the huge fin-like tail that suggests they are going to blast off into space like jet planes; or the streamlined shape of the modern toaster, suggesting it is ready to do a qualifying heat with the equally streamlined flat iron; or a gas station styled to look like a quaint English cottage, where one might expect to get tea and crumpets rather than a tank full of high-test gasoline. (*Continued on the next page*)

In graphic arts there have been many and thrilling improvements. The increased use of photography, discovery of new techniques, and the developments in paper and ink-making have brought about a veritable revolution in the industry. The designers have kept pace by giving us new and good type styles. A clean, refreshing look in layout is evident. Why then is it necessary to cheapen and contaminate this progress with such obvious dishonesty as the utter disregard of all the time-tested rules of capitalization? To use lowercase letters for titles, proper names, or the deity is achieving nothing more than merely being different. Another common violation of a fundamental design principle in typography is the practice of using old-style and modern sans-serif type faces in combinations.

Contemporary architecture has contributed much for which it can be justly proud. Gone is the gingerbread of yesteryear and the extreme use of ornate (and dust collecting) moldings. A clean, simple, yet interesting look is the result. But, if this trend is good and desirable in houses, why isn't it reflected in car design? Look at any view of a modern car—front, rear, side, or top—and one would be led to believe that all the fancy moldings that are no longer being used by the builders of houses have been chrome plated and are now being used by the automobile industry.

It would seem that something is amiss when it takes well over a ton of chrome and steel, powered by a 200-horsepower engine, to convey my wife, who weighs 120 pounds, to the supermarket for a jar of instant coffee.

The foregoing examples are cited to emphasize the point that, as we try to achieve good design, useful and beautiful, in our school-shop projects, it is not enough simply to copy existing trends. It is necessary to know the fundamentals of good design and to be able to recognize them when we see them in a well designed article. This will take some concentrated thought and effort, but the results will be worthwhile. Such effort will result in a much improved appearance in our shop projects; it will also be personally rewarding by increasing our ability to discriminate and to appreciate beautiful things. Most important of all, it will inevitably result in pupil growth in a phase of industrial arts that has been neglected too long: good design. ★

Are You Moving? If so, send the name and address of your new school and the subjects you will teach to SCHOOL SHOP, 330 Thompson Street, Ann Arbor, Michigan.

It's always a problem

Clean Up!

By David C. Lewis

Daniel Webster Junior-High School, Los Angeles, California

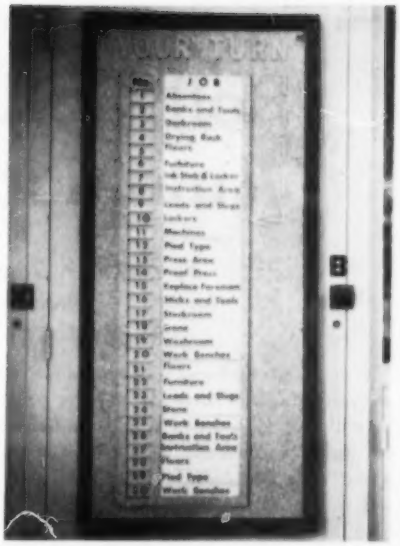
THERE are probably as many different techniques used in cleaning up shop classes as there are ways to lose money. Even the clean-up charts are so varied they resemble anything from a stray copy of the daily bulletin to a flashy, siren-sounding fugitive from a Las Vegas roulette parlor, complete with vari-hued lights and an electronic alarm circuit. Against such an impressive array it would take a brave soul to say that he had found the one answer.

The chart shown in the photograph was designed and built as a cooperative effort of an entire shop department.

Top billing in this board is shared by simplicity of design and the clever provision for exacting the most efficient clean-up effort from any-sized class. While 24 pupils is looked on as a maximum class, it sometimes happens that as many as 30 answer roll in the overloaded periods. Consequently, the chart is geared to this number.

The designing was done in the industrial-drawing classes after initial discussions in shop meetings had established the basic requirements. When completed, the drawings were submitted to the shop teachers. This set off the biggest series of engineering changes since the B-47 made its first operational flight. In truth, the speed and numbers in which these IEEC's (Industrial Education Engineering Changes) came was such as to make one believe they would continue long after the chart was obsolete and had been replaced by a new design.

While the wood-shop floor accumulated equal quantities of sawdust and change orders, the graphic-arts lab printed several copies of each clean-up job title. These were mounted on individual pieces of Masonite. This gave several sets which ran from 10 to 15 different jobs, according to the requirements of the various shops. One set of titles was inserted in the chart opposite the seat numbers, starting with number one. Assuming that there were 15 different jobs, then the chart would be ready for a class of 15 pupils.



A clean-up chart listing jobs for 30 students.

Next step was to determine which job should be assigned another student if the class size was increased by one. This step was repeated until the chart held assignments to accommodate a class of 30. The chart had a number of repeat titles with perhaps four boys assigned to "floors." If job requirements or emphasis changed so that it was desirable to have five boys clean the floors, then the instructor would remove the least necessary job and insert a fifth panel reading "floors." Of course, the least essential job would always be placed at the bottom of the chart where it would not be used except for a period having 30 boys.

A variation for which the chart is well adapted is consideration of every possible class size, from one pupil to 30, and assignment of jobs in order of importance. In effect, an instructor could decide what one clean-up job should be done if only one pupil was enrolled. Next, he would decide what other job should be done if the class were limited to two. These jobs might very well be the same, in which case he could duplicate panels opposite #1 and #2. This process could be repeated until 30 panels were inserted.

If desired, jobs or numbers can be rotated to change assignments. An ingenious design by the metal shop provides for removal of the vertical strip on the left side of the numbers. The change takes but a moment. ★

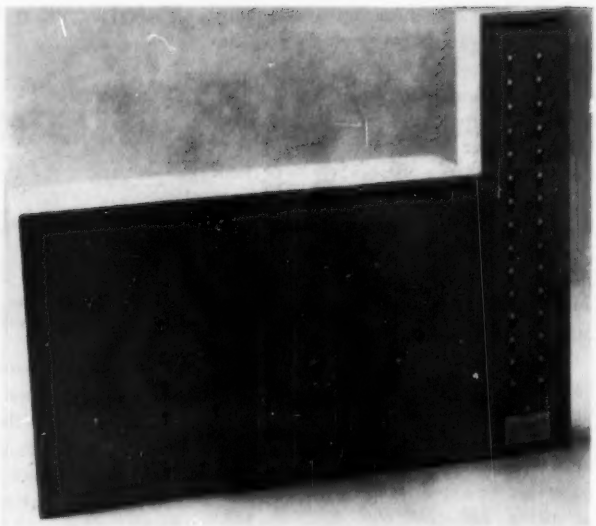
Bill of Materials

Panel	22" x 48" of ¾" plywood
Border	1½" square/bevel
Divider strips	⅛"x¾"x40" rabbeted
Mounting material	strips
⅛" Masonite	1¼" x 2½" (job number)
	1¼" x 7½" (job name)

From obsolete pin-ball machines

Roll Call Is Automated

By Lewis W. Gale
Bountiful, Utah, High School



This intricate electrical roll-call machine has started a lad on his way to a career in electrical engineering

Ford Motor Company Photo

IF you were told you waste six days of your students' time during the year in roll call alone, you would probably be quite astonished. Yet that is just about what you do if your roll-call period consumes even as little as two minutes. Most boys come to class filled with enthusiasm, wanting to get busy with their hands, wanting to satisfy their desires for accomplishing something, only to have these desires stifled by a slow, tedious process called roll call.

Industrial-arts students at Bountiful High School in Utah do not have this problem any more due to an ingenious device invented by one of its students. Our shop students have fun letting a machine call the roll.

Merrill Smedley, a senior, entered his electric roll-call machine (see photos and drawing at right) in the Utah State Industrial Arts contest sponsored by the Sears Roebuck Company. It won first-place honors. More recently it was entered in the Industrial Arts Awards of the Ford Motor Company. In this contest it won second place.

The machine is unique in that it is made of equipment that would cost well over $500 but in reality set the school back only $16. The story behind this is a tale in itself and warrants some mention here.

I discovered that the management of the local amusement resort discarded its old pin-ball machines when they became obsolete. Each of these machines contains transformers, relays, switches, sockets, solenoids, and miles of wire which I felt would be valuable in teaching electricity. The manager of the resort was only too happy to give us this used equipment and, after removing the working parts, we found we could do many things with them.

Merrill became so intensely interested in these parts that he began to spend hours with me making a machine which we have dubbed our "clean-up machine." I won't bother to describe it here but it operates in a manner similar to the roll-call machine that will be described.

It was Merrill's idea that something as unique as this might have a chance in the Ford IAA contest and so he went to work on the roll-call machine. At the outset we had an understanding that since this was to be his entry it was also to be his work. With but a few suggestions and some minor adjustments we stuck to this bargain.

So young Smedley went to work. He inventoried the parts and retired to the quiet of his home to design his machine. In all, he spent well over 200 hours on his project.

The processes and agonies are implicit and explicit in the drawing at right. However, its manner of functioning must be described, so here goes.

The first student coming into the classroom presses a starting button. This activates solenoids which turn on 31 lights. These lights are mounted behind a piece of ¾" plywood drilled with ½" holes. In these holes are clear plastic rods which have been sanded down on the ends to direct light to the front of the panel. Thirty of the lights are numbered one to thirty, one light for each student. The other six lights are numbered one to six, one for each class period. (Only one of these lights is on at a time, so, one plus 30 equals 31, the total number of lights turned on when the first student punches the appropriate button.)

As each student enters the classroom, he presses a numbered button corresponding to his roll number. Four things happen: (1) the corresponding light is shut off; (2) the button is deactivated so that it cannot be pushed again; (3) a counter is activated which will turn the entire machine off when a preset number is reached; (4) a numbering machine is activated which shines a light through a disc of numbers and projects this number on a piece of plastic on the front panel.

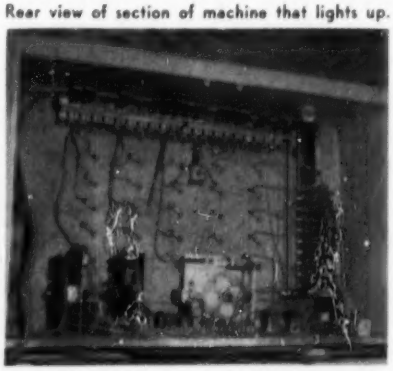
Each time a button is pushed the machine counts that student and shows how many students have pushed buttons. The machine can be set for any number for any class by plugging a colored wire corresponding to each class to a bar having the various numbers on it. When this number is reached, the machine activates a magnetic switch which turns the machine off, indicating all students are present.

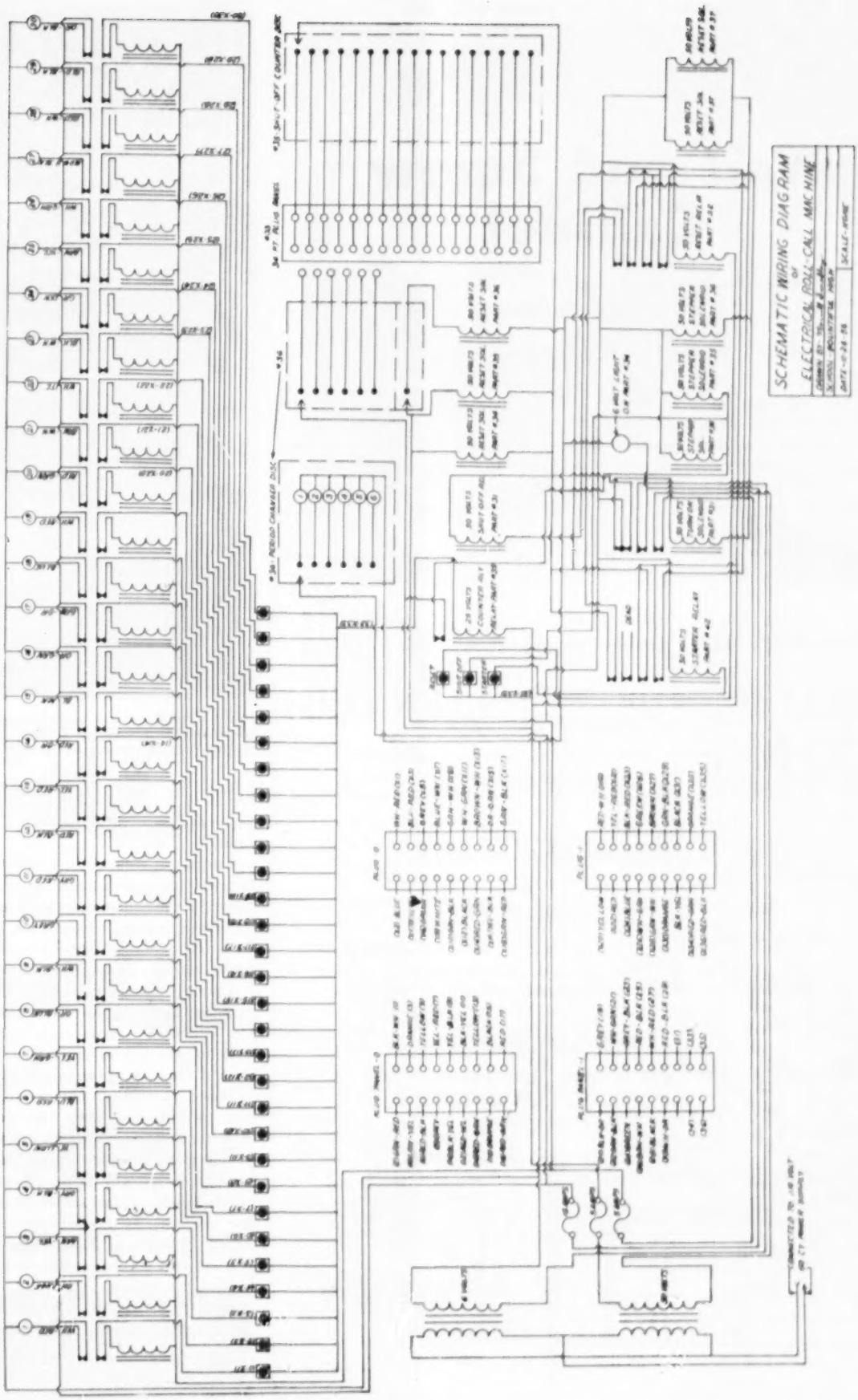
If students are absent, the teacher can readily spot who they are by the lights that are left on. And, to eliminate the problem of having students "punch" each other in, the teacher has only to check the seats—each one corresponds to a light—and he can tell at a glance who is present and who is not. A second check on this practice of a questionable character is for the teacher to check the total number punched in—it's recorded on the machine—and count the boys present. Any discrepancy indicates mischief.

Pin-ball machine servicing companies

(*Continued on page* 23)

Rear view of section of machine that lights up.




SCHEMATIC WIRING DIAGRAM
OF
ELECTRICAL ROLL-CALL MACHINE

System and organization can be yours with this

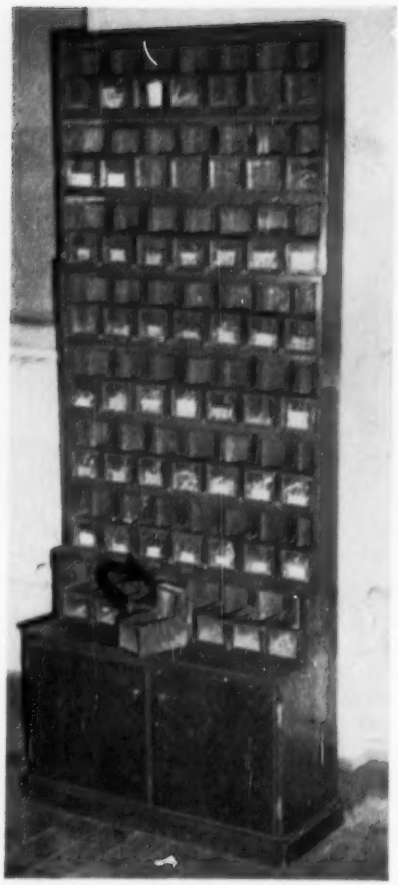
Nail and Screw Cabinet

By Floyd R. Huffman

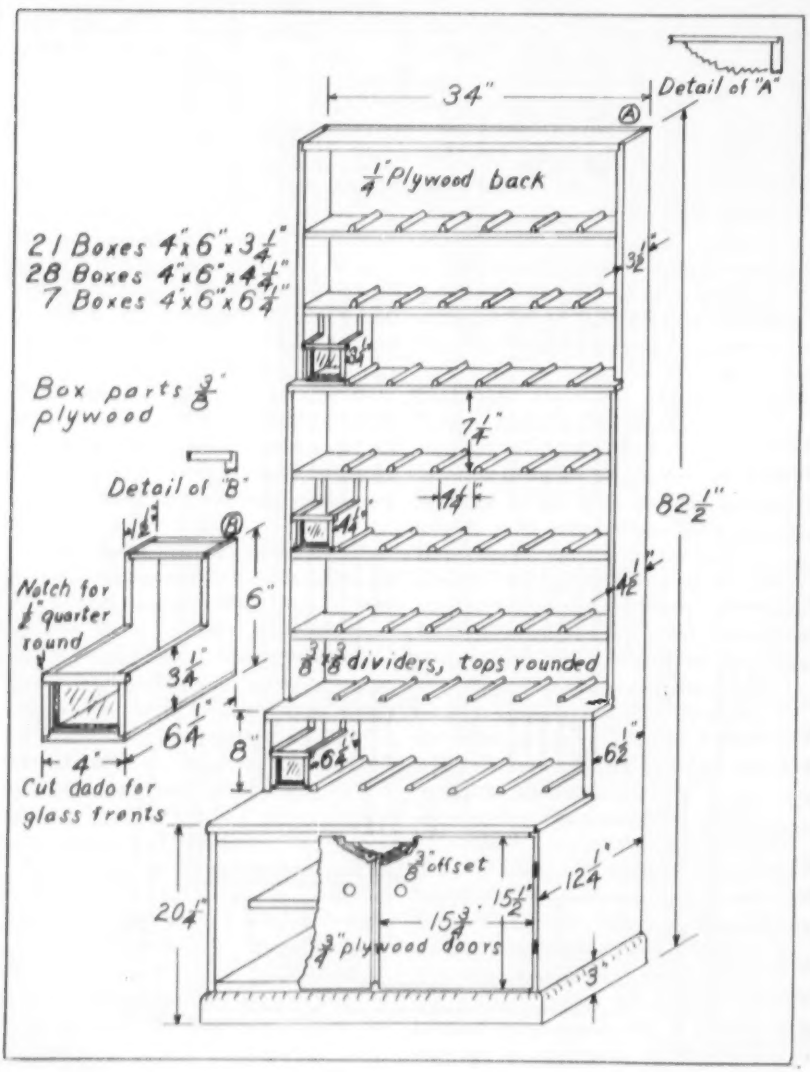
Redwood Falls, Minnesota, High School

SYSTEM and organization in storage and use of nails, screws, and other similar small items used in industrial-arts shops is something desired by many instructors. The nail and screw cabinet illustrated here is our answer.

The cabinet, with its 56 glass-fronted containers, is readily available to students. They can see what is in each container and make their selections at the cabinet or take the container to their work benches. In either case, the mixing



The completed nail and screw cabinet with an arrow pointing toward one of the small, glass-fronted drawers that can be taken to a bench.



or loss of the contents is kept to a minimum.

Covers cut from the original boxes of screws are scotch-taped to the glass fronts of the containers. Cards are made to identify other items and are fastened in a like manner. These identifications assist students in learning terminology.

Empty containers are turned around with the backs to the front. The top of the container serves as a convenient grip for the boy to carry the container to and from its place in the cabinet.

When containers are removed from the cabinet and taken to the work benches it is found that the contents are in an ideal position for use when the containers are laid on their backs. This position allows for easier removal of the contents as needed and tends to avoid the waste of those extras that are left out and get lost or misplaced at the end of the period.

The containers will also be found to be desirable places to put miscellaneous and seldom used items such as screw eyes and hooks, bolts, washers, escutcheon pins, cotter pins, rivets, etc. ★

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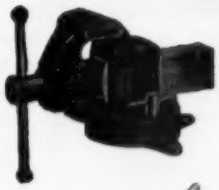

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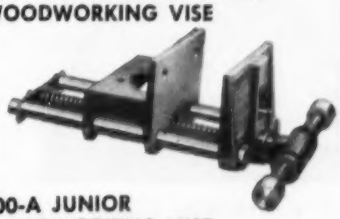

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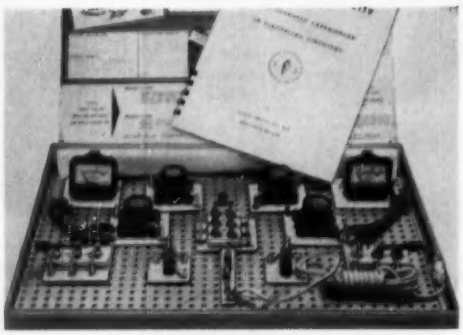

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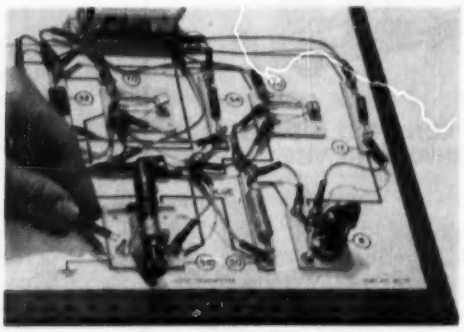

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AVA's 1958 Convention To Be Held August 11-15

THE American Vocational Association will hold its 52nd annual convention this summer in Buffalo, New York, August 11-15. This will be the second year the convention has been held during the summer months.

At the time of going to press we were unable to obtain from the AVA the list of speakers for the general sessions, but several outstanding speakers are being lined up, according to reports.

A special feature of the convention this year will be a buffet dinner and a trip to Niagara Falls for all conventioneers on Tuesday afternoon, Aug. 12. This trip will be held instead of a general meeting that night. The first general session will be held Tuesday morning and the second general session on Wednesday morning. The usual Ship's program and dance will be held on Thursday evening.

Programs announced for the various divisions and subsidiary organizations in the T&I and industrial-arts fields will offer worthwhile, practical discussions.

The T&I group will hold a joint meeting on Monday with the National Association of Industrial Teacher Educators, the National Council of Local Administrators, the National Association of State Supervisors of T&I Education, and the American Technical Education Association to discuss "Research Vital to Trade and Technical Education." Nelson J. Murbach of the New York State Education Department will serve as chairman.

The T&I group will hold division meetings from Tuesday through Thursday on the topic, "Programs Essential to Developing the Nation's Skilled Manpower." C. Thomas Olivo, chief of vocational curriculum and industrial training development, New York state, is program chairman for this group.

Lawrence G. Derthick, U. S. Commissioner of Education, will speak at a breakfast meeting of the National Association of Industrial Teacher Educators on Tuesday.

The industrial-arts division has scheduled meetings on such topics as "Implications for Industrial Arts in a Technological Society," "Power Mechanics," "Electricity and Electronics for Industrial Arts," and "Brainstorming, a Dynamic Technique for Problem Solving." John Fontana, professor of industrial-arts education at State College for Teachers at Buffalo, N.Y., is program chairman.

The business meeting of the House of Delegates will be held Friday night to end the convention. ★

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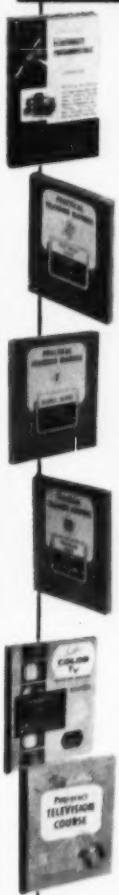

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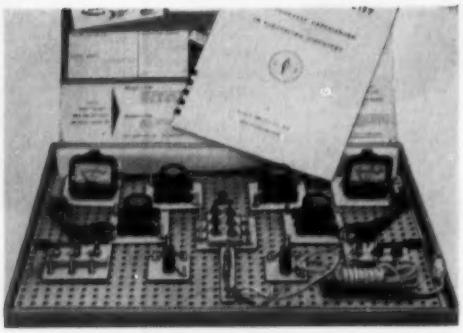

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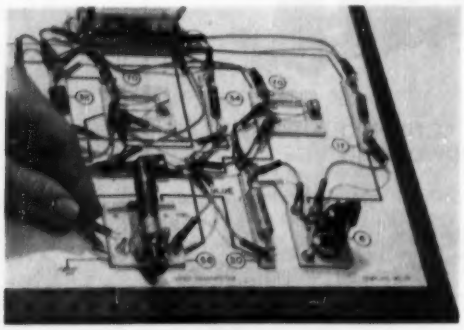

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AVA's 1958 Convention To Be Held August 11-15

THE American Vocational Association will hold its 52nd annual convention this summer in Buffalo, New York, August 11-15. This will be the second year the convention has been held during the summer months.

At the time of going to press we were unable to obtain from the AVA the list of speakers for the general sessions, but several outstanding speakers are being lined up, according to reports.

A special feature of the convention this year will be a buffet dinner and a trip to Niagara Falls for all conventioneers on Tuesday afternoon, Aug. 12. This trip will be held instead of a general meeting that night. The first general session will be held Tuesday morning and the second general session on Wednesday morning. The usual Ship's program and dance will be held on Thursday evening.

Programs announced for the various divisions and subsidiary organizations in the T&I and industrial-arts fields will offer worthwhile, practical discussions.

The T&I group will hold a joint meeting on Monday with the National Association of Industrial Teacher Educators, the National Council of Local Administrators, the National Association of State Supervisors of T&I Education, and the American Technical Education Association to discuss "Research Vital to Trade and Technical Education." Nelson J. Murbach of the New York State Education Department will serve as chairman.

The T&I group will hold division meetings from Tuesday through Thursday on the topic, "Programs Essential to Developing the Nation's Skilled Manpower." C. Thomas Olivo, chief of vocational curriculum and industrial training development, New York state, is program chairman for this group.

Lawrence G. Derthick, U. S. Commissioner of Education, will speak at a breakfast meeting of the National Association of Industrial Teacher Educators on Tuesday.

The industrial-arts division has scheduled meetings on such topics as "Implications for Industrial Arts in a Technological Society," "Power Mechanics," "Electricity and Electronics for Industrial Arts," and "Brainstorming, a Dynamic Technique for Problem Solving." John Fontana, professor of industrial-arts education at State College for Teachers at Buffalo, N.Y., is program chairman.

The business meeting of the House of Delegates will be held Friday night to end the convention. ★

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Diamond Dust

Abrasive comments from that doughty Scot, Tom Diamond, former head, Department of Vocational Education, University of Michigan, Ann Arbor.

The World Do Move

If there were no means of escape from it, I would be compelled to admit that I am hopelessly behind the times in regard to the march of human progress. As a matter of fact I am still wondering about the bright soul who discovered that friend of all pipe smokers—the common match. People accept it as one of the necessities of life which has always been with us. Rarely do they reflect on the problems that faced the fellows who lacked this convenient means of producing light and heat.

There are those who have long since graduated from the match era and depend entirely on their more or less trustworthy Ronson, but I am still lagging behind in this respect. I have made numerous efforts to keep up with this evidence of progress, but each time I have become more convinced that the modern lighter is a snare and an abomination. I have been told by my more advanced friends that my failure may be attributed to my characteristic reluctance to keep the gadget supplied with fuel. While there may be an element of truth in this, it is difficult for me to understand why anyone would willfully discontinue using a medium which can be obtained—for free—from certain philanthropic merchants and rely on a contrivance which has to be fed, and which has the uphappy knack of refusing to function at the most critical moments.

This obvious lag in my reaction to scientific advancement would seem to indicate that I am unqualified to present the suggestion that shop teachers are failing in their duty if they neglect to adapt themselves to the changes going on in the fields of science and industry.

During my lifetime I have seen road transportation develop from the one-lunger, whose staccato bark could be heard for miles, as it meandered slowly along the dusty highway, to the modern sleek model, with its automatic shift, power steering, and automatic push-button windows. Between these extremes we had the model-T Ford. It was a beautiful contraption—in its day—and it was so simple that even I could fill the grease cups and perform the frequent operations—by the roadside—on its vulnerable tires. Today, if I can remember the combination, I can still raise the hood of my car. But, when I look down into the maze of levers and wires, I find that I am hopelessly lost. This is merely additional evidence that I am lagging behind the procession.

All of this is bad, but the situation becomes more impossible when I reflect that the airplane era has come and is rapidly passing as we penetrate the area of outer space.

Changes have been taking place, too, in the transmission of power. At one time we depended on the slide-valve steam engine. Then the Corliss valve was introduced. This was followed by the gas engine, and then the diesel engine appeared. Somewhere in this progress the application of electricity to the production of motion was introduced, and now we come to the elusive atom.

But, someone may ask, of what interest has all this boloney to a shop teacher? If one reflects on the question, it must become apparent that all of the areas of human progress mentioned here have a definite relationship to one or another of the activities being carried on in our school shops.

Change is going on constantly in the world. New materials, new methods, and

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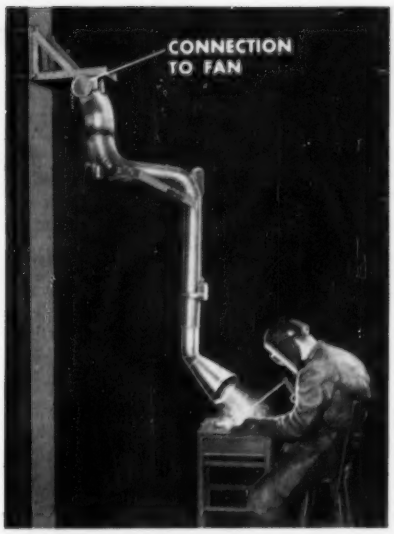

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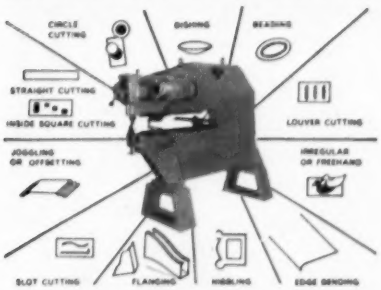

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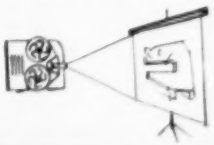

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new processes are being discovered, and the application of these to industrial products has a profound effect on man's behavior.

Shop teachers profess to prepare young people to understand, and to adjust themselves to, an industrial world. If they are to achieve this, it is imperative that they keep in step with the progress being made in their fields. This is a *must* if they hope to meet their responsibilities and thus earn the respect of their pupils.

Some teachers are satisfied to perpetuate the ideas, projects, and practices they encountered in a teachers college 20 years ago. While these may have been suitable for that period, it is almost certain that many of them have become obsolete, while others have been modified as a result of recent discoveries.

The skill and knowledge acquired in college, or elsewhere, in the early part of the century may still be useful, and should be taught. Let us keep in mind, however, that some things, like the stagecoach, become obsolete and that new things, like atomic energy, are constantly appearing. Science is not static. It is alive, and being alive, it grows, each generation building on to the creations of the previous generations.

Similarly, shop teachers must grow. They must keep themselves informed concerning new developments in their fields, to the end that they may be able to discard the obsolete and stress the modern. ★

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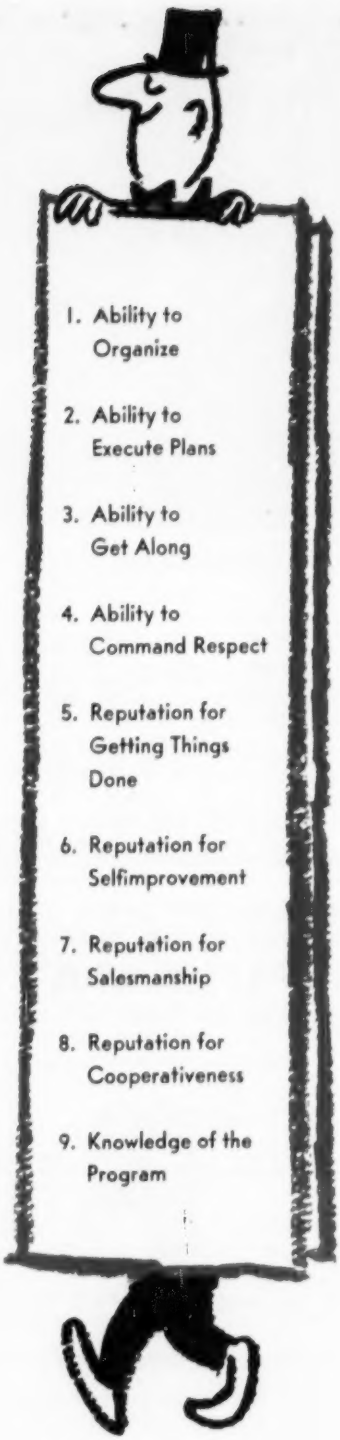
A Good Department Head

By John W. Walgren

Supervisor, Industrial-Arts Education, State of Illinois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8. Reputation for Cooperativeness
9. Knowledge of the Program

IN most schools, even where there are only two teachers of industrial arts, one is designated as head of the department. This may mean much or little, depending on the ability of the head and the responsibility delegated to him by the school administration.

Although the duties and responsibilities of the department head vary from school to school, there are many which are common to most positions of this nature. Following are some observations on the duties and responsibilities of the department head and several suggestions for operational procedure which can be of help in making a selfevaluation if you are a department head or have aspirations in that direction.

The success of the department head depends largely on his ability to direct the efforts of people and the degree to which they will cooperate with him. He must have clearly in mind the duties and responsibilities expected of him. The manner in which these duties are carried out can either strengthen or weaken the industrial-arts department and establish or destroy the confidence and respect of the staff.

What It Takes

Heads of industrial-arts departments are usually chosen because of certain characteristics exhibited while they were shop teachers. Following are the characteristics that superintendents and principals look for when selecting department heads:

1. The ability to organize work.
2. The manner in which this organization is carried out.
3. The ability to get along with people.
4. The ability to command respect and confidence.
5. The reputation for getting things done.
6. Continual selfimprovement, but not at other people's expense.
7. Salesmanship ability.
8. A genial and cooperative attitude.
9. Thorough knowledge of the program.

Seldom does a newly elected department head excel in all these abilities. The effectiveness of a department head increases as he continues to improve in his abilities and assumes the responsibilities of his position.

When a department head has supervisory responsibilities, it usually means that he is responsible for the work of this staff. His success will depend largely on his planning and how well his leadership is accepted.

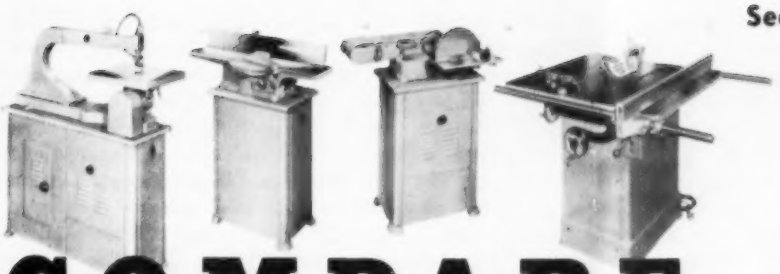
What Are His Responsibilities?

A new department head often wonders what his responsibilities and duties *are*, as well as what they *should be*. When his responsibilities are not clearly defined, there is real danger that he will be criticized later for either assuming responsibilities which were not intended to be his or neglecting responsibilities which he did not realize were a part of his job.

Heads of industrial-arts departments should have the following duties and responsibilities. The newly appointed head will do well to review this list with his administrator to determine exactly the nature and extent of his work:

1. Prepare, approve, or recommend supplies and equipment lists for purchase.
2. Assist in shop planning.
3. Supervise the installation of new equipment and replacement of old equipment.
4. Conduct departmental meetings and individual conferences with staff members.
5. Prepare and administer the budget.
6. Report the work and progress of the department to the school administration.
7. Acquaint school and community with the aims of industrial education.
8. Publicize department activities and accomplishments throughout the school and community.
9. Coordinate work of the department with other departments in the school.
10. Develop a long-term plan for the industrial-arts program.
11. Keep the staff continuously in-

(*Continued on page* 35)



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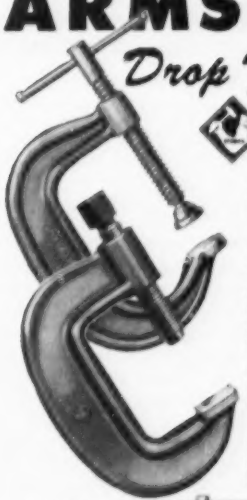

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happenings in industrial education

Washington Requirement Withdrawn

SHOP training is no longer a graduation requirement for boys in the state of Washington. Following objections from parents, the State Board of Education has removed the requirement and made shop subjects optional.

IA Awards Entries Judged

APPROXIMATELY 40,000 entries in the annual Industrial Arts Awards contest, sponsored by the Ford Motor Co., have been judged in student craftsman's fairs in more than 50 cities during the past two months. Final judging will take place next month at Dearborn with entries in 14 divisions of shopwork and grade levels. The contest is open to high-school students in public and non-public high schools in the United States and Canada.

Rocketry Safety

STUDENT experimentation with rockets and other missiles should be prohibited unless the activity is rigidly controlled and expertly supervised, according to U. S. Office of Education officials. "Young people's interest in rocketry and other scientific fields should definitely be encouraged," declared Lawrence G. Derthick, U. S. Commissioner of Education. "However, recent serious accidents involving persons experimenting with rockets emphasize the need for strict precautions." Under no circumstances, according to Willis C. Brown, USOE specialist for aviation education, should a youth build a rocket, mix rocket fuel, load a rocket, or attempt to launch it without supervision by an adult rocket expert. Nor should a youth work alone with rocket fuel in a home workshop or school laboratory, he adds. A selected bibliography of recent publications entitled "Jets, Rockets, and Space Exploration" has been prepared for high-school students and teachers. A limited supply of free copies is available on request from Publications Services, U. S. Office of Education, Washington 25, D. C.

Epsilon Pi Tau Activities

A NEW field chapter, Lambda, was recently organized in Sacramento, Calif., to serve seven central California counties for Epsilon Pi Tau, honorary industrial-arts fraternity. Jack E. Reynolds, supervisor of industrial arts for the Sacramento schools, is the executive officer of the chapter.

Two Florida chapters, the University of Miami and the Tampa field chapter, held initiations recently with 14 new members being added at Miami and five at Tampa. Ten new members were also initiated at the Oswego, N.Y., State Teachers College chapter in March. Professor H. H. London of the University of Missouri department of industrial education was named an honorary member of Southern Illinois University chapter at Carbondale. Ten other new members were also taken into the group.

State Meetings Held

IDAHO.—The annual meeting of the Idaho Industrial Arts Association was held in Boise on March 28 with the following new officers elected: president, Irving L. Stiber, Caldwell High School; vice-president, Martin W. Metz, North Junior High School, Boise; and secretary-treasurer, James O. Coleman, East Junior High School, Boise.

CALIFORNIA.—Over 2400 persons attended the 29th annual meeting of the California Industrial Education Association at Long Beach, March 14-15. An unusually large number of commercial and educational exhibits added to the interest of the sessions.

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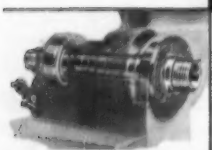

"Zero Precision" tapered roller bearings support the spindle, retain their accuracy, and eliminate costly bearing maintenance.

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They minimize supervision and work load requirements for instructors. They end laborious and costly maintenance. The large "Zero Precision" Taperer Roller Spindle Bearings hold their accuracy in spite of student abuse. Bearing maintenance is reduced to a fractional turn of a take-up collar after long hard usage.

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Convention Calendar

Georgia Vocational Association, Atlanta Biltmore Hotel, Atlanta, June 12-13.

Foundry Instructors' Seminar, Case Institute of Technology, Cleveland, June 19-21.

Pelican State Vocational Association, Southern University, Baton Rouge, La., July 8-11.

International Graphic Arts Education Association, Stout State College, Menomonie, Wis., Aug. 3-7.

American Vocational Association, Buffalo, N.Y., Aug. 11-15.

Industrial Arts Association of Pennsylvania, Hershey, Pa., Oct. 24-25.

Kentucky Industrial Education Association, Kentucky Hotel, Louisville, Nov. 7-8.

New England Industrial Arts Teachers Association, Eastland Hotel, Portland, Me., Nov. 14-15.

NEW JERSEY.—Meeting at Asbury Park for its 40th annual convention March 13-15, the New Jersey Vocational and Arts Association had for its theme, "Vocational and Arts Education for the Atomic Age." New officers elected were: president, Philip Haney; treasurer, Edmund Boyer; and secretary, Richard Harthmann.

NEW HAMPSHIRE.—The New Hampshire Industrial Education Association, under the current officers, Robert Turner, president, John Nay, vice-president, and Fred Sienko, secretary-treasurer, has held seven area meetings during the year. A project fair is scheduled for May 23-24 at Concord.

MICHIGAN.—The Michigan Industrial Education Society held its 30th annual convention on April 17-19 at Lansing in the new Civic Center. An unusually large attendance with extensive educational and commercial exhibits marked the meeting. New officers are: president, Andrew C. Luff, Western Michigan University, Kalamazoo; vice-president, John Dyksterhouse, Allegan schools; and executive secretary-treasurer, John Koenig, Midland schools. Verne C. Fryklund, president, Stout State College, was the banquet speaker. Recipient of the master teacher award was H. H. Harrison of Marshall.

Roll Call . . . . . . *from page 12*

served as a source of materials, too. However, we did have to buy 2 solenoids, 33 buttons, 37 light bulbs, fuses, plastic, and lumber for the case. Total cost: $16. However, the cost is really insignificant when you consider what young Smedley learned. Even in addition to what he learned at the time, he learned what kind of career he wants to pursue. If you haven't guessed, it's electrical engineering. ★

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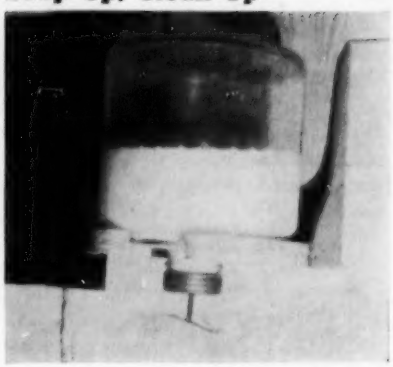
Everybody Pays for Rags

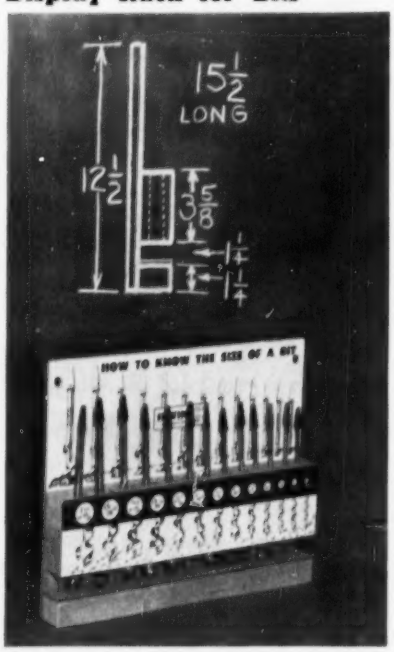
Designate a week or two during the school term when the industrial-arts department will pay fifteen cents per pound for clean cotton rags. The entire student body will have the opportunity of participating in an industrial-arts effort, and you will have a big supply of "wipers" for less than half the retail cost.—*Stanley F. Schneck, Southern Lehigh High School, Coopersburg, Pa.*

Soap Up, Clean Up



The kerosene tank from a discarded kerosene stove placed in a rack over the wash sink makes a handy dispenser for liquid soap. The liquid soap can be made readily by adding water to regular soap powders or liquids. A touch of the stem brings as much soap as is desired.—*Robert S. Tupper, Canton, S.D., High School.*

Display Rack for Bits



Using the display poster offered by a well-known manufacturer makes a dual purpose auger-bit stand. The back is of ½" plywood and the front pieces are of "2 by" material, 1⅝" thick. The holes are 1/16" larger than the bit sizes for ease in racking. (The 1-1/16" hole for the #16 bit is bored with an expansive bit.)

A strip of leather is glued in place for a cushion on the bottom. Two holes are then bored in the upper corners so the rack can be hung on the toolroom wall and removed for demonstration and bench use.—*Stan Schirmacher, Papago School, Phoenix, Ariz.* ★

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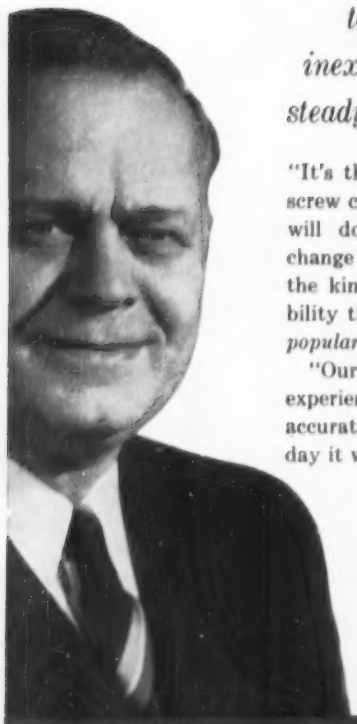

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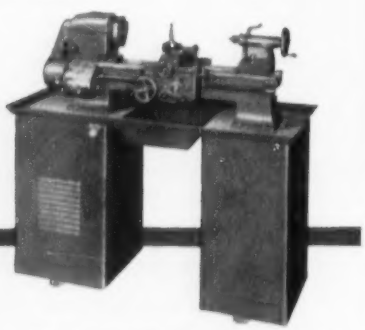

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Books:

Shop Tools—Care and Repair. Hunt. Princeton, N.J.. D. Van Nostrand Co., Inc., 1958. Pp. vii+252. $4.20.

The problem of maintaining the tools and equipment used in an industrial shop is always a serious one. This is true whether they are in an industrial plant or in a school shop. This manual, therefore, should serve as an effective guide for anyone who has the responsibility of keeping them in good working condition.

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There should be a copy in every shop library, to be used as an instructional aid as well as a reference when tools need to be sharpened.

De Witt Hunt is Professor of Industrial Arts, retired, Oklahoma State University, Stillwater.

How to Read Schematic Diagrams. Mark. New York: John F. Rider Publisher, Inc., 1957. Pp. 147. $3.50.

This book has been written to assist the reader in his efforts to interpret schematic diagrams. It is intended for students as well as hobbyists and technicians who are interested in electronics.

It explains in simple terms the basic theory of the subject, and helps the student to recognize the symbols and pictorial representation of electronic components. No previous knowledge of the subject is necessary to learn from the book.

Adventures in Science Series. May. Chicago: Popular Science Press, 1958. 1. **Chemistry.** Pp. xii+156. $2.50. 2. **Electronics.** Pp. ix+170. $2.50. 3. **Atomic Energy.** Pp. ix+174. $2.50.

These books contain a series of adventures in science. They are intended to provide an interesting introduction to the fields represented and are geared to the level of the beginner. A number of experiments are included in each of them. They are designed to assist young people in discovering whether or not they have aptitude for, or interest in, one of these scientific areas.

Classrooms in the Factories. Clark and Sloan. New York: Associated College Press, 1958. Pp. xiii+139. $3.75.

This is a report on the educational activities carried on by leading corporations in American industry. The report is based on an intensive study of the programs in operation in 500 of the largest industrial plants in the country.

The contents of the book include factual material on the educational activities carried on by the companies, the subjects taught, and the areas in which instruction is given. Among these areas we find orientation, technical courses, general education courses, and courses in human relations.

School people will find the report of interest since it provides them with a picture of what industry considers to be important in the training of industrial workers.

Harold F. Clark is Professor of Educational Economics, Columbia University. Harold S. Sloan is Adjunct Professor of Economics, New York University.

Chilton's Automotive Job Sheets. Bostwick and Barr. Philadelphia: Chilton Company, 1958. Vol. I., **The Engine, with Supplement on the Fuel System.** Pp. xiii+136. $3.80. Vol. II., **The Chassis.** Pp. xiii+69. $2.45. Vol. III., **The Automotive Electrical System.** Pp. xiii+80. $2.45.

These volumes have been prepared as an aid to teachers in presenting three different areas in the field of automechanics. The material included is divided into units, each unit being a complete lesson in itself. The units contain information covering the tools to be used and the procedure to be followed on the job to be done. Lists of questions are provided in order to insure that the pupil understands what he has learned from the lesson.

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Harold S. Bostwick is Coordinator, Dobbins Vocational-Technical School, Philadelphia, Pa. Randolph R. Barr is Coordinator, Mastbaum Vocational-Technical School, Philadelphia, Pa.

Pamphlets:

Civil Defense and Vocational Education is a 28-page booklet that points up the urgent need of civil defense; alerts vocational educators to their responsibilities in civil defense; states the relationship of the part played by vocational educators to the role played by the total education program in civil defense; recognizes the contributions vocational education is now making to civil defense; and suggests additional contributions which can be made in preparation for disaster and in case of disaster. Available by writing to the American Vocational Association, Inc., 1010 Vermont Ave., N.W., Washington 5, D.C.

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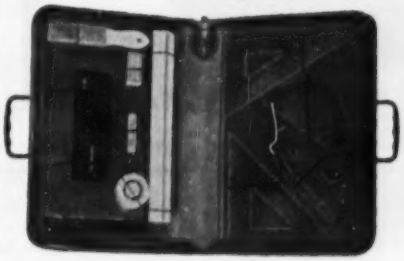

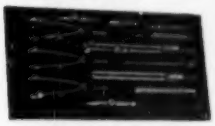

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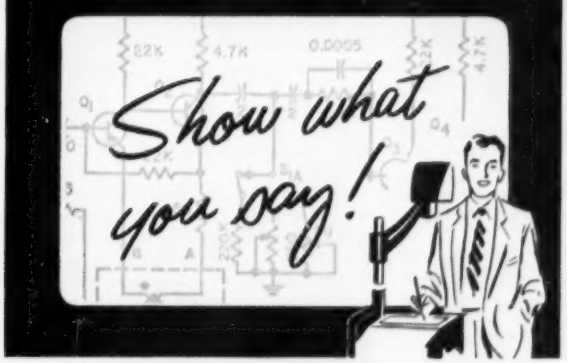

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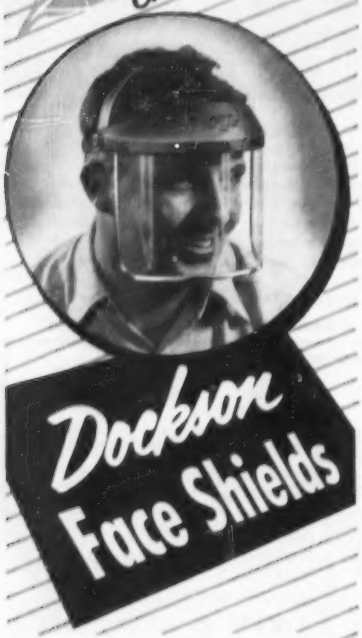

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news from Industry

(Circle the numbers on the card in this issue to secure the items listed.)

Wetzler Clamp Introduces A Small Clamp: "Clampette"

The Wetzler Clamp Company announces a small clamp that is said to be handy for carpentry and sheetmetal work. Called the Clampette, the firm says that the jaws are made of strong, high-grade malleable iron and have a depth of 2½". Bars and spindle are made of cold drawn spring steel, fitted with an easy grip, smooth, hard maple handle, the firm states.

Clampette comes in sizes with 5", 8", and 12" openings.

For additional information write to the Wetzler Clamp Co., 43-15 11th St., Long Island City 1, N.Y., mentioning SCHOOL SHOP; or *circle no. J-1 on the business-reply card.*

American Wood Type to Handle Swingline Electric Saddle Stapler

Officials of the American Wood Type Manufacturing Company have recently announced their appointment as distributor of Swingline electric saddle staplers.

The machine has a 10" throat, uses ¼" leg staples, and can staple a 120-page book of 60# coated paper. It comes equipped with a foot pedal, the firm adds, and a safety guard prevents accidents to fingers.

The company feels this stapling machine is particularly suited to graphic-arts departments in school shops.

For additional information write to the American Wood Type Mfg. Co., 42-25 Ninth St., Long Island City 1, N.Y., mentioning SCHOOL SHOP; or *circle no. J-2 on the business-reply card.*

Wilton's New Drill-Press Vise Has Giant-Sized Jaws

A new drill-press vise made by Wilton Tool Manufacturing Company features large jaw capacity with relatively compact outside dimensions.

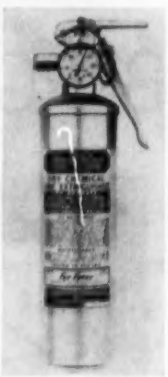
The model shown here is used to hold a work piece that is 4½" deep, 8½" long, and 2¾" high. The outside dimensions of this vise are 4½" x 2-13/16" long, and the maximum jaw opening is 4½".

Other features of the vise, according to the firm, are: machined top, bottom, and sides for accurate 90° hole drilling without a fixture; and the firm's Rapid Titan Nut which combines free sliding action with unlimited screw action, without use of moving parts.

Three jaw sizes available are: 3½", 4½", and 6".

For additional information write to the Wilton Tool Mfg. Co., Inc., Schiller Park, Ill., mentioning SCHOOL SHOP; or *circle no. J-3 on the business-reply card.*

Fyr-Fyter Extinguisher Uses Dry Chemical Powder



The Model 23-1, a 2½-lb. pressured extinguisher manufactured by the Fyr-Fyter Company, uses dry chemical powder, an effective killer of both flammable liquid and electric fires, the firm states.

The company says, too, that the extinguisher is especially suitable where on-the-spot protection is desired against incipient fires in gas, oil, paint, chemicals, and electrical equipment.

Depression of the squeeze lever spreads a 60° wide-angle blanket of nonfreeze, nontoxic, non-conducting, dry chemical powder to a range of 12'. This model is rated at 2-B,C by the Underwriters' Laboratories.

For additional information write to the Fyr-Fyter Co., 221 Crane St., Dayton 3, Ohio; mentioning SCHOOL SHOP; or *circle no. J-4 on the business-reply card.*

Estwing's "Three-in-One" Hatchet Features Vinyl-Nylon Grip

The new hatchet recently announced by the Estwing Manufacturing Company features among other things a cushion grip, balanced construction, and is forged of one piece of tool steel, the firm states.

The company also says the hatchet is safe and durable because the head cannot fly off and the handle won't dent or become chewed off. Furthermore, the firm says, there are no

welds, joints, or pins to become loose or break.

The new hatchet is available in two sizes: #1 has a 3⅛" cutting edge; #2 has a 3⅝" edge. Both come with either a painted finish or polished steel.

For additional information write to the Estwing Mfg. Co., Rockford, Ill., mentioning SCHOOL SHOP; *or circle no. J-5 on the business-reply card.*

Atlas Introduces Its 12-Inch Screw-Cutting Lathe

The Atlas Press Company's new 12", back-geared, screw-cutting lathe has a capacity of 12¼" swing over bed, 12" swing over saddle

wings, 8" over cross slide, and up to 36" between centers, the firm states.

The company adds the lathe has a new heavy-duty bed and carriage and a massive headstock and tailstock.

Additional specifications are: thread range, quick-change gear lathes, 54 selections, 4 to 240; standard-change gear lathes, 98 selections, 4 to 96; 16 spindle speeds, 8 direct, 8 back geared; speed range, 28 to 2072 rpm.

For additional information write to the Atlas Press Co., 2273 North Pitcher St., Kalamazoo, Mich., mentioning SCHOOL SHOP; or *circle no. J-6 on the business-reply card.*

Arcline Announces Portable Storage Cabinet

The Louvre-tray portable storage cabinet recently announced by the Arcline Products Company contains 13 varied compartments, each operating on a patented louvred principle.

The firm states this operating principle permits all trays to be quickly and conveniently opened at one time, allowing for all trays to be seen at once for immediate "finger-tip selection" of desired items.

Made of 26-gage steel with a gray hammertone finish offering maximum weather and shock resistance, the louvre-tray has an overall size of 12" x 13½" x 6".

For additional information write to the Arcline Products Co., 1415 W. Shakespeare Ave., Chicago 14, Ill., mentioning SCHOOL SHOP; or *circle no. J-7 on the business-reply card.*

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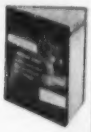

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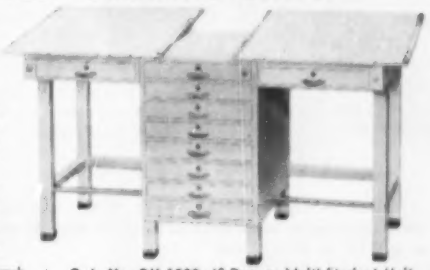

Cat. No. DU 1000. 10-Drawer Multi-Student Unit with Dual Drawing Tables. One of the many combinations possible from seven basic styles designed for groups of 6, 7, 9, 10 and 12 students. Drawing tables attach to right or left of cabinet unit. Shipped K.D.

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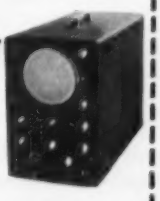

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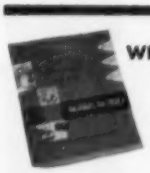

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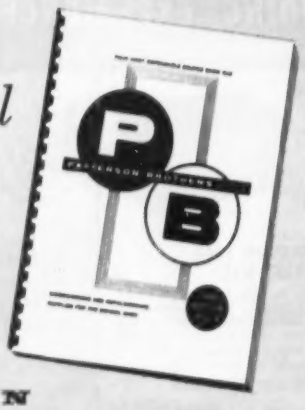

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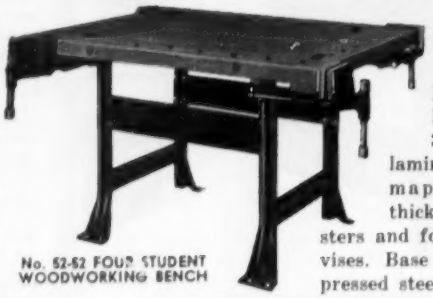
No. 52-36 TWO-STUDENT WOODWORKING BENCH

Leg Base Woodworking Benches



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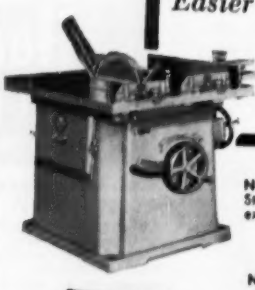

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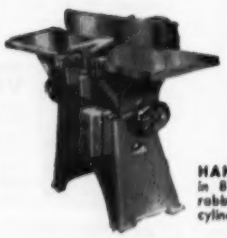

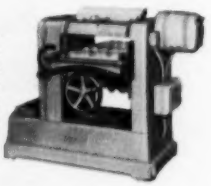

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Spee-Flo Announces Hot-Spray Unit for Schools

The Model 300-APE spraying unit recently announced by the Spee-Flo Company is especially suitable for use in wood finishing in school shops, the firm announces.

In addition, the company has recently published a 27-page booklet titled *Why Not Spray?* The booklet tells how to maintain a spray gun, how to use it most efficiently, offers case studies in its use, and ends with a series of questions and answers on spraying.

For additional information about Model 300-APE and the booklet write to the Spee-Flo Co., 6614 Harrisburg Blvd., Houston 11, Tex., mentioning SCHOOL SHOP; or *circle no. J-8 on the business-reply card.*

New "Oil Monitor" from Champion Reduces Down-Time on Air Compressors

The Champion Pneumatic Machinery Company has announced a new protective device which prevents recycling when compressor crankcase oil level falls below a safe limit, the major cause of down-time, the firm states.

Standard equipment on Champion's 1958 line of stationary and portable air compressors, the oil monitor employs a micro switch which the firm claims makes it impossible for the compressor to start a new cycle unless sufficient oil is present to do a thorough lubricating job.

All compressors in the Champion line, from 1½ hp to 10 hp, are fitted with the monitor.

For additional information about Champion air compressors write to Champion Pneumatic Machinery Co., at Princeton, Ill., mentioning SCHOOL SHOP; or *circle no. J-9 on the business-reply card.*

New Literature:

School Shop Projects is the 18-page project book recently published by the Kastaline Company. The publication describes the many and varied casting projects that the firm makes. The projects come in kit form, including castings or parts required, engineering drawings as well as step-by-step instructions. The catalog is free by writing the Kastaline Co., 2042 Lane Blvd., Kalamazoo, Mich., mentioning SCHOOL SHOP; or *circle no. J-10 on the business-reply card.*

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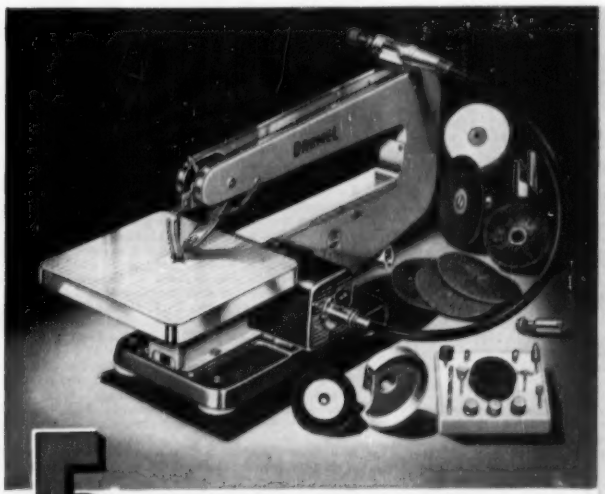

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Flexible-shaft attachment is ideal for drilling holes, polishing and buffing jewelry, grinding stilt marks, removing fire scale, wood carving, engraving, etc. Other attachments have hundreds of classroom uses.

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2 DISC SANDER
3 BUFFING WHEEL
4 BENCH GRINDER
5 FLEXIBLE SHAFT

Model 57 Moto-Shop. Includes jig saw and disc sander. Other attachments can be added later **$33.95**

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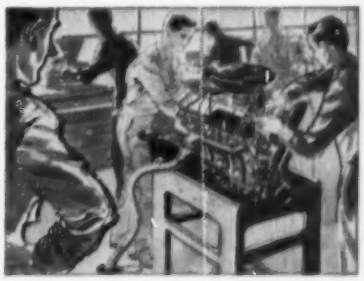

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Department Head *from page 20*

formed about pertinent new books, magazine articles, new projects, related material, safety practices, visual aids, and other professional developments.

12. Encourage improvement of staff members by having them prepare professional articles for publication, attend and participate in educational meetings, and enrol for additional educational courses which will upgrade their professional standing and teaching competency.

13. Cooperate with curriculum committees.

14. Promote and establish industrial-arts classes, adult courses, and extra-curricular organizations.

15. Direct and approve the revision of instructional materials and courses of study.

16. Assist in coordinating courses within a shop field and in coordinating each shop field with others.

17. Act as spokesman for the department with the administration and public.

18. Keep the staff posted on administration policies.

19. Orient new teachers.

20. Eliminate health hazards.

21. Promote shop safety.

22. Upgrade the shops, including good housekeeping.

23. Secure representation for the department on over-all school planning committees, *i.e.*, curriculum, guidance, correlation, policy planning, etc.

24. Secure adequate financial support for the department.

25. Inform each person about how he is "getting along."

26. Give credit when credit is due.

27. Inform people in advance about changes that will affect them.

28. Be aware of particular abilities of staff members and develop and recognize opportunities where they may be used.

29. Prepare periodic reports of activities and achievements, including an annual summary for the administration.

30. Set a good example for staff members—attitudes and habits are better caught than taught.

Some Additional Duties

Some department heads are directly responsible for improvement of the entire program which can only be done through exercising supervisory responsibilities such as:

1. Evaluating the total industrial-education program and the work of each individual teacher.

2. Observing shop and classroom instruction and offering constructive comment and criticism when appropriate.

3. Assisting in the selection of new staff members.

4. Developing a pattern for handling miscellaneous problems which affect the department welfare, *i.e.*, discipline, personnel, schedules, staff morale, etc. ★

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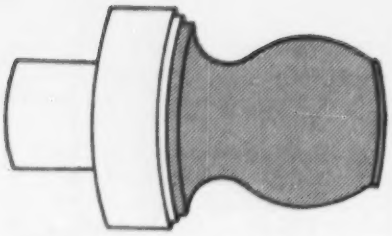

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Washington . . . . *from page 40*

hard foes have been speaking their pieces about education. It's time for the representatives of the people to act. They will do so in accordance with their idea as to how the people want them to act.

Getting Together.—All is well with the 1959 appropriations for vocational education—and the states will have the same amount as was appropriated for this year, that is, $33,750,000. We wouldn't have mentioned this item at all, except that it brings to mind that the Bureau of Apprenticeship did not fare as well with its appropriations request as did the federal Vocational Education Division. The House cut the Apprenticeship Bureau some $300,000, fearing that the Bureau would use the money "for getting into the field of vocational education."

With this action the House recognized the concern of many vocational educators about the Bureau's intentions. True, the concern isn't as great as it was last year. In the words of the House Appropriations Committee: "The people concerned are much more nearly in agreement than was the case a year ago. It is still obvious that not all the differences (between apprenticeship leaders and vocational educators) have yet been resolved."

M. D. Mobley, AVA chieftain, says that some of the remaining differences will be examined by a joint committee which the AVA and the Bureau of Apprenticeship have set up. (Sam Fick, California's chief for industrial education, heads the AVA's delegation to the joint body.) This new group plans to meet three or four times a year to see how public vocational school and apprenticeship agencies can work more closely together. If the joint committee proves its worth at the national level, it's possible that similar groups might spring up at the state levels.

Russia's Technicums.—We have been hearing and reading about Russia's famed *technicums*. But the immense scope and specialization of these institutions came to us with new impact on looking into a Russian-language *Spro vochnik* dealing with these schools.

Spro vochnik means directory; and is intended for persons between the ages of 14 and 30 who plan to enter these middle, specialized educational institutions. The copy in our hands is for 1957. It lists the schools by name, address, specialization, and control for each of the 15 Soviet Republics. If our count is accurate, the directory lists close to 4000 *technicums*. Their scope is bewildering; their method of control equally so. But they must do the job which the Russian rulers require of them, if the current news from the Soviet Union means anything.

To get a close-up of the *technicums*, we examined the list for the city of Kiev and its environs. Here we count 42 *technicums* teaching specialties in fuel, metallurgy, power and electrical engineering, machine construction, chemicals, food, paper, railroading, highway construction, plumbing, forestry, agriculture, geology, construction, sanitation systems, leather, and occupations which can only be translated as "zoo-technology" and "telemechanics." In addition, there are *technicums* for statistics,

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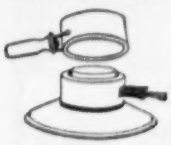

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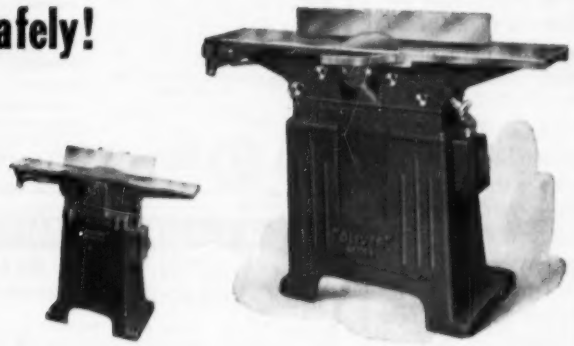

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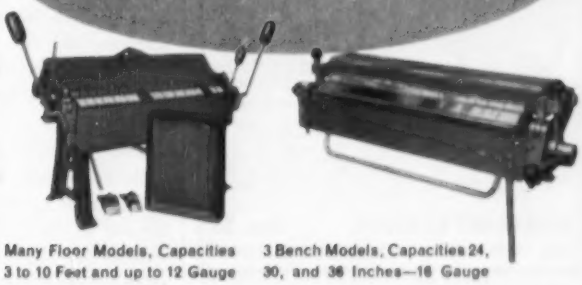

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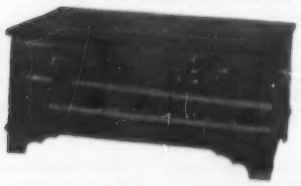

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One amazing fact is that nearly each and everyone of these is under the control of a different ministry of industry or service; very few are under the ministry of education. The idea is that the ministry of power plants or the ministry of building materials knows more about training people for their industries than anyone else.

This diversity of control has led to some headaches. We have been told that 24 different ministries are training technicians in metal cutting. And there are reports of the ministry of metallurgy training specialists in forestry. But such inconsistencies do not trouble the Slavic mind and the *technicums* continue their gargantuan job of supplying Russian industry with the subprofessional manpower it needs.

What Are Teacher Competencies?—Back in 1948, the Office of Education sponsored a conference on training teachers in trade and industrial education, and we understand that the deliberations of that meeting helped set the guidelines for teacher training in trade and industrial education during the past decade.

Now it's 1958—and time to take a new look at that problem—which is what took place in Kansas City, Missouri, May 12 through 16. What interested us, sitting in Washington, was the preparation for the Kansas City conference on teacher training. The T&I education branch, under Jack Walsh, carried on no less than four studies. These were devoted to an analysis of state certification requirements for T&I teachers; analysis of state plans for teacher training; analysis of state teacher-training programs; and finally, and most important, a search for the competencies that should go into the making of trade and industrial teachers.

As this was being written the search for the competencies was not over. It was being carried on with the help of T&I teacher trainers, state supervisory personnel, and successful teachers themselves. It was to be continued at the Kansas City conference. When the search is over, and there is some agreement on what the T&I teachers should know, understand, and be able to do, we'll have a document of considerable significance. The competencies—that is, those important for a teacher to have—will affect the design of teacher-education courses. In other words, a new pattern for teacher education is in all likelihood about to emerge.

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We have used the word "search" a couple of times earlier. What has actually been taking place is this: The Office of Education circulated a list of competencies which a T&I teacher might find useful in his work and asked those receiving it to check which they thought most important, very important, important, less important, and not important. When all the returns are in, tabulated, and analyzed, the results should give us a picture of the ideal T&I teacher to be developed through teacher-training activities.

While we wait for the returns and the final report, let's get into the game ourselves. Out of the 100-odd items, let's select a dozen; and let's ask which of these you think most important, very important, important, less important, and not important. Here we go, and rate these items as honestly as possible:

1. A good T&I teacher should have a knowledge of the basic philosophy of public education.

2. He should understand the relationship between vocational trade and industrial education and the other phases of the educational program.

3. He should understand the principles of human relations applied to student, faculty, and community relations.

4. He should know the purpose, services, locations, and the representatives of organizations in the community concerned with the placement or utilization of the product of the trade and industrial education program.

5. He should understand the principles of learning applied to teaching trade and industrial subjects.

6. He should know the procedure for developing an instructional plan.

7. He should know the safe practices in teaching the operation of industrial equipment.

8. He should have a knowledge of federal, state, and local laws pertaining to vocational trade and industrial education.

9. He should have the ability to work as a member of a professional team in planning a suitable educational program for the vocational student.

10. He should be able to interpret trade and industrial education programs to fellow educators and the community.

11. He should be able to assist students in identifying and resolving problems.

12. He should be able to organize an effective program of placement and follow-up for trainees.

He should indeed know and be able to do all these—but which are more important, and which less? ★

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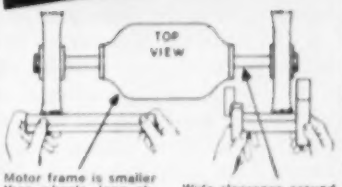

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from Washington

by Michael Paca

A Sleeper.—The major activity of Congress, even during these final weeks of its life, continues to center on introducing new bills—none of which have the slightest chance for enactment. Just to sample the latest batch of bills is to see in how many directions Congress would go at one and the same time. Thus, there are being introduced a spate of new bills seeking to return to the states a portion of federal income taxes to be used for education; to provide loans, rather than grants, for school construction; to set up "more realistic"—meaning more limited—plans for scholarships and science grants; to pour more surplus foods into school lunchrooms; to provide tax relief for persons who attend school themselves or support children in school; and, finally, there are bills reviving that old, old idea that is supposed to cure problems of education, juvenile delinquency, youth joblessness, and national morale—that of setting up a youth conservation corps.

Just how many education bills there are in Congress today need not concern us too much, though the estimates run from several hundred to over one thousand. The only important bill, however, that has any chance of approval had not yet been written by the end of April. It was in the process of preparation in the Senate Labor and Public Welfare Committee, under the editorship of Sen. Lister Hill (D., Ala.). The process was a slow one. Mr. Hill's task was to reexamine the scores of bills that had been referred to his committee, including the Eisenhower-Folsom measure; to study the testimony of some of the longest hearings on record; and then to come up with a draft that will have the approval of his committee, of the policy leaders in Congress, and of a majority of Senators.

Mr. Hill, let it be said, is the person and the power in Congress today on whom depends any constructive action for education. He is determined to see a bill through, at least through the Senate. And he is being encouraged by Lyndon Johnson (D., Texas), who wields more power in the Senate than any other single individual. With these two gentlemen, if they continue to cooperate, on the side of educational legislation, something positive ought to take place before Congress goes home late this summer.

Mr. Hill's determination is being tempered by political realities. He is said to be asking over and over: What measure CAN be approved? rather than, What measure NEEDS to be approved?

Well, as a first attempt, Mr. Hill will probably ask for many more types of aid than he knows he can get. But when the chips are down, Mr. Hill will probably be satisfied with a measure which will (*a*) provide for college scholarships to able students; (*b*) will help school systems buy equipment for science, math, and foreign language instruction; and (*c*) will encourage state departments of education to improve their supervision of science and math instruction.

The first draft of the Hill bill, when it emerges from committee, will most certainly include a section seeking $20,000,000 for area vocational programs. But the role of this provision, in its draft form, is in dispute. Some say it will be included primarily for throw-away purposes; that is, since some members of Congress will look for something to eliminate from any proposed measure, the area vocational item might be the one to be thrown to the wolves. Others say that the area vocational provision will be included in the measure to demonstrate to the Bureau of the Budget and to the Joint Federal-State Action Committee that Congress has no intention of eliminating funds for vocational education in 1960, but hopes to increase them.

As the weather warms in Washington, Mr. Hill's big aim is to get a bill on the Senate floor. This is also Mr. Johnson's aim; both practical legislators know that the sentiment of the people and of Congress will jell only when that takes place. Ever since January, the experts, the lobbyists, the well-wishers, and the die-

(*Continued on page 36*)

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1	Parent Metal Products, Inc.	30
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3	Patterson Bros.	30
4	Pioneer-Toledo Corp.	39
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HERE'S PROOF OF PERFORMANCE:

"My eight Clausing 6328 Lathes are the finest lathes for instructional use I have ever seen. Their safety features, ruggedness and ease of operation make them tops in their field. You offer so many more features than any other lathe that I would vote for a Clausing every time."

Harold Burgan, Spokane, Washington

CLAUSING 6300-series 12¾" LATHES

are "TOPS for safety... ruggedness... ease of operation"

Harold Burgan's statement above is typical. Instructors everywhere report Clausing Lathes set the standard for safety, rugged construction, ease of operation and Value! Here are a few reasons why:

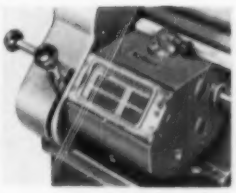
Headstock, apron and quick-change are *totally enclosed* . . . inquiring fingers can't get into these danger zones, nor can dirt or chips . . . all gears and shafts travel in a bath of oil. All controls . . . including those for back gear engagement . . . are located outside machine. Spindle nose is tapered Key-lock . . . eliminates danger of chuck run-off on braking or reversing.

Flame hardened bed ways for longer wear are standard equipment *at no extra cost.* Spindle is forged steel, turns on Timken "Zero-Precision" tapered roller bearings. Apron and quick-change gears are protected by safety devices . . . lead screw has easy-to-replace shear pin.

Drive is underneath . . . no exposed belts or pulleys. Has heavy-duty ball bearing countershaft. Two V-belts drive the spindle . . . belts are outboard for easy replacement.

Get the facts and compare with any other lathe in its class . . . feature for feature, dollar for dollar. We know you'll agree Clausing 6300-series are today's outstanding values . . . *the* lathes for *your* shop. Write for illustrated literature today.

Enclosed construction of headstock provides greater rigidity, safety . . . longer service life. All gears, shafts and bearings travel in a pumped bath of oil.



Quick-change box, too, is totally enclosed and gears and shafts turn in bath of oil . . . another important safety and long-service-life feature exclusive with Clausing in lathes of its class.

CONDENSED SPECIFICATIONS

Swing over bed	12¾"
Between centers	21½", 33½", 47"
Hole thru spindle	1⅜"
Thread range	54 selections, 4 to 224 Standard right or left
Motor recommended	1 or 1½ HP, 1 or 2 speed

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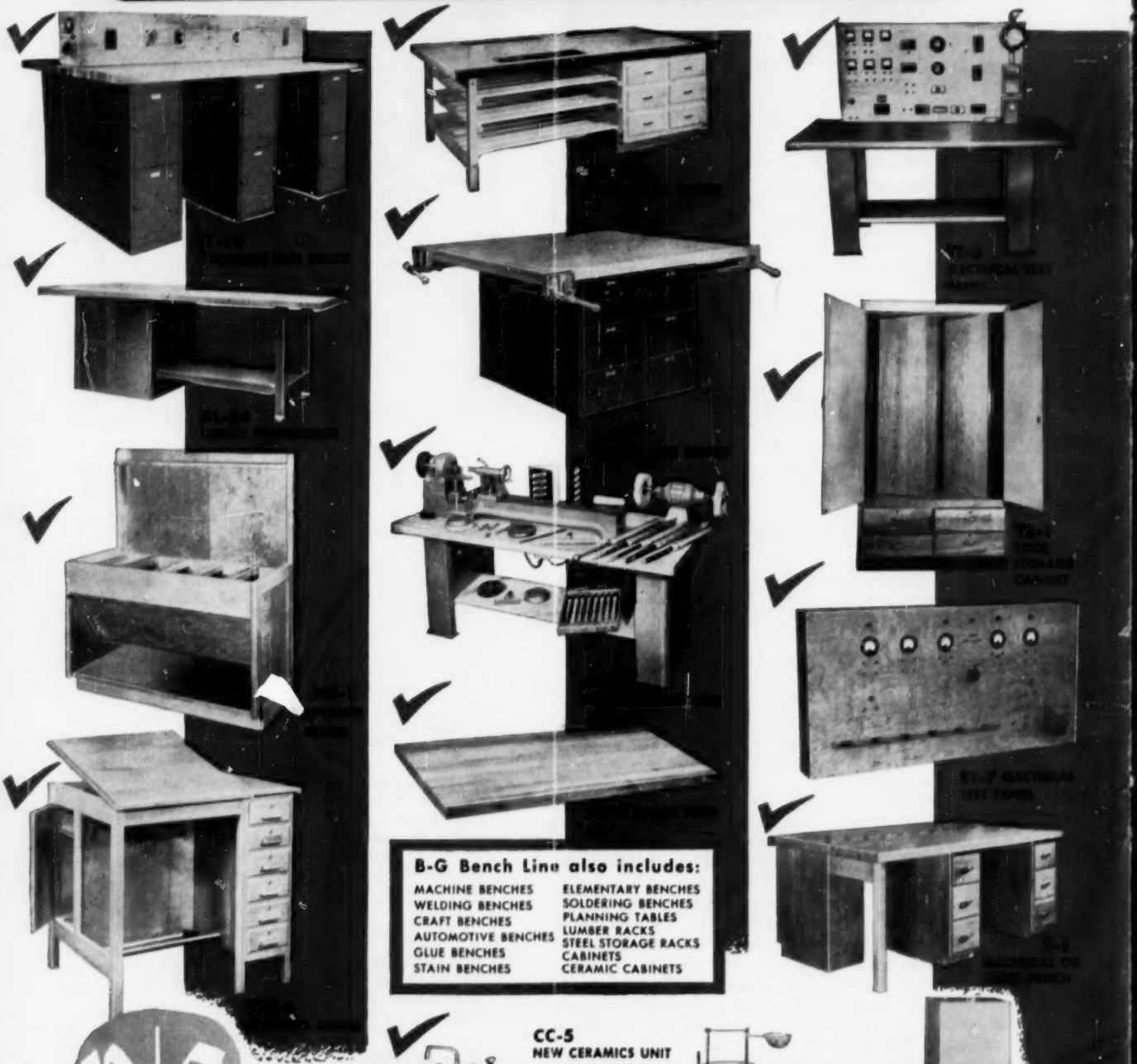

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